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NEWSPAPER

# DP Industry Doing Its Share for Handicapped?

**By Toni Wiseman**
Of the CW Staff

With the recent surge in interest in the welfare and civil liberties of people with physical and mental handicaps, it has been suggested that computer manufacturers have not been doing their fair share.

Unfortunately, for the image of the DP industry, it is almost impossible to refute or confirm that allegation

*Computerworld* recently conducted a random survey of several manufacturers and, while all stated they had Affirmative Action plans for hiring employees with handicaps, none could produce any figures on exactly how many were employed or in what capacity.

IBM has long been known for its excellent work in this area and was cited as the exception to the rule in the industry [CW, April 4]. But even IBM could not produce figures.

"We don't know the total number of IBM employees who are handicapped," an IBM spokesman said. "We have only two ways of identifying handicapped employees. One way is visually. If a person is blind, confined to a wheelchair, etc., he can be visually identified," he said.

"Employees whose handicaps are not visible, such as heart disease, epilepsy patients . . . are identified only if they choose to reveal their disability. In this case, they advise their manager of their disability and the disability is confirmed by the responsible IBM medical department.

"In no case are medical records made available to management," the spokesman stated. "No search of medical records is ever done in IBM This would be a violation of employee privacy and is forbidden by corporate directive," he stated

"Burroughs Corp. employs the handicapped in all areas of its business, production, engineering and administration, based on their ability to perform without regard to their physical or mental handicap," a company spokesman indicated.

But, he said, since each facility carries out its own program, there is no available figure for the number of handicapped individuals currently employed.

Data General Corp has "generally had a pretty broad policy even before [it was] required by law as long as the individual could perform the work he was hired for," a spokesman said, noting the firm had many diabetics, epileptics and workers with cancer in remission

DG had a blind systems analyst at one time and currently has an amputee, he noted, but those were the only figures available.

While DG is open to hiring handicapped employees, it has no formal program to train such individuals and no active recruitment policy.

(Continued on Page 2)

# 'Edos/VS' Marks First Response To IBM Release 34

**By Don Leavitt**
Of the CW Staff

RICHMOND, Va — The first response to IBM's Release 34 of DOS/VS and its Advanced Functions-DOS/VS package [CW, May 9] wasn't long in coming from the independent software marketplace

The Computer Software Co. (TCSC) last week announced a VS-oriented version of its Extended Disk Operating System (Edos) Edos/VS uses IBM's Release 34 as a base and then provides an array of extra features similar in purpose to those in IBM's Advanced Functions package.

Edos/VS differs sharply from the IBM software in one significant respect The independent's package can be used on IBM 360 and non-VS 370 mainframes as well as those CPUs equipped for virtual operations, whereas the IBM programs can only be used on VS-based 370s

### Avoids VS Overhead

Even when Edos/VS is on a "virtual" 370, it may run in real or virtual mode In this way, if all work is going to fit in available real memory, the user can avoid the overhead of virtual operations but still use the facilities of Edos/VS. TCSC noted

The original Edos was introduced five years ago, when IBM announced DOS for the 360 was "functionally stabilized" with Release 26 and later releases would be for the 370 exclusively Since then Edos has included support for operating system enhancements, spooling of output, tape management, disk space management and linkage to a data base management system.

Support for six partitions was one of the highlights of Edos in an era when IBM's DOS/360 supported only three partitions.

Under Edos/VS, users will have essentially all existing Edos features as well as a number of additional ones, according to TCSC Extended procedure library support was highlighted by a spokesman as "certain to be the most powerful single feature of Edos/VS" as he discussed the introduction at a meeting of Edos users here last week

But he also listed an automatic Initial Program Loan (IPL) procedure which allows standard system IPL statements to be cataloged so little or no operator intervention is needed to set the system in opera-

(Continued on Page 4)

## Commission Staffer Points Out

# Privacy Laws to Affect Every DP Shop

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Privacy legislation for the private sector, whether passed by the federal government or the states, is going to have major technical implications for all DP shops that maintain records about individuals, a staff member of the Privacy Protection Study Commission indicated here last week

For one thing, such laws will most likely require the development of systems that permit only extremely limited access to portions of records in data base systems, according to Art Bushkin

Furthermore, there will probably be a requirement for the implementation of systems that keep "data about data," the project manager and staff technical adviser to the commission said here last week

The broad outlines of the technical requirements that will be needed when and if privacy laws covering the private sector are passed are already taking shape, Bushkin said

The commission must understand these implications, he added, and the technical implications of the recommendations it will make to the President and Congress this summer.

Among the data management implications of privacy legislation and the commission's recommendations is what Bushkin calls "finer granularity."

Most data management software packages use the "record" as the unit or basis for an information system, he explained. In order to increase the level of privacy for information contained in records on individuals, a trend has developed toward limiting access to those records through software, Bushkin said

This "more fine grained access" is illustrated by the payroll specialist who logs on to a system and is only provided with payroll information from an individual's record even though that record contains more than payroll data, he stated

Multipurpose data bases are behind this trend toward limited access to the records that make up information systems, Bushkin contended

"Descriptor data" or "data about data" goes hand-in-hand with limited access to records, according to Bushkin. There need to be items in the record that direct its user

(Continued on Page 4)

# Mainframes Not Always a Must, Citibank Officer Advises Users

**By Nancy French**
Of the CW Staff

NEW YORK — Many users only "think they need" a large mainframe to process their daily information workload But given the capabilities of today's "superminis," such an assumption can be quite incorrect, according to Linda Ewen, systems vice-president at Citibank — an organization here that recently traded its central DP facility for a minicomputer in each user department

One way to test "whether you really need a 512K mainframe" is to examine the largest single program on that mainframe and calculate its overall memory requirements, Ewen told a Computer Caravan audience here last week

Next, subtract all the buffer space, deduct further for file control and file space and, on top of that, subtract all the operating system requirements.

The results could tell quite a different story, according to Ewen, who managed the bank's decentralization project since its inception two years ago.

Ewen, whose bias toward minicomputers is contagious, said users commonly rely on five myths to justify the use of a large centralized DP shop rather than small computers in the user departments.

The first myth is that minicomputers are "mini-sized," she said

The Interdata 8/32s at Citibank — most of which sport 500K bytes of 32-bit memory and some even 1M bytes — belie that argument

The second myth — that minicomputers "have mini software" — is also a fallacy,

(Continued on Page 4)

# 'DS/3000' Lets Users Process Data on Any HP 3000-II in Net

**By John P. Hebert**
Of the CW Staff

PALO ALTO, Calif.— Hewlett-Packard Co. has introduced a communications software product which reportedly allows any terminal tied to one HP 3000 minicomputer to access and process data on another 3000 in a data communications network

The Distributed Systems/3000 (DS/3000) makes it possible to use HP 3000 Series II systems on-line in a distributed processing network, according to the firm

An "unlimited" number of the minicomputers can be connected to each other in a network operating with the software DS/3000 is an extension of the HP 3000 Multiprogramming Executive (MPE II) operating system and includes communications hardware, HP said

Communications can take place through asynchronous hard-wired connections or through half- or full-duplex dial-up or leased lines from common carriers, according to a spokesman

The latter type of connection operates under "standard IBM Binary Synchronous Communications [BSC] line discipline," he said

Up to seven HP 3000s, each with DS/3000, can interact simultaneously to give their users program-to-program communications, dynamic job allocation and source data entry capabilities, among other system functions, the spokesman claimed.

Network operations with the capability

(Continued on Page 5)

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## *In Response to FCC Order*

# AT&T Proposes Restructured Wats Rates

**By Ronald A. Frank**
Of the CW Staff

NEW YORK — AT&T has proposed a restructuring of its interstate Wide Area Telecommunications Service (Wats) rates that reportedly will reduce monthly charges for two-thirds of existing customers.

The remaining one-third will receive rate increases and, while most of these will be high-volume users, some low-volume Wats customers will also get increases, according to AT&T.

The new rates were filed by Bell in response to an order by the Federal Communications Commission (FCC) requiring the phone company to bring its charges in line with the costs of providing the service.

A key element of the proposed rate structure is separate charges for outward and inward Wats services. Under the plan, inward Wats service costs less than outward Wats because of the physical plant required to provide the service, a spokesman said.

The tariff revisions combine the existing full business day and measured time Wats services into separate "usage-sensitive" rates for outward and inward service. Outward Wats customers will pay an initial charge ranging from $213/mo to $270/mo for the first 10 hours; for the next 30 hours of usage, the cost will range from $11.85/hr to $16.95/hr.

Inward Wats rates will be $30/mo per line for the required minimum two lines plus $114.90 to $147.70 for the first 10 hours of usage.

### Three Service Areas

The geographic distribution of Wats areas will change from the present five bands to three service areas. Band 1 will become A-1; Bands 2, 3 and 4 will be combined into A-2; Band 5 will become A-3; and Alaska and Hawaii will be added to the Wats service as A-4.

In some cases, where large increases have been proposed, AT&T has filed a six-month interim rate to take effect on August 1 with the final rates to take effect Feb. 1, 1978.

A Wats customer now using Band 1 service for 25 hours from New York pays $416/mo. Under the proposed rates this user would pay $390/mo for outward Wats and $347 for inward Wats.

The same user with Band 5 service now pays $520/mo for 25 hours of usage from New York. This customer will pay $524/mo for outward Wats and $429/mo for inward Wats with A-3 service under the proposed rates, AT&T said.

A Band 5 customer in New York with 240 hours of usage now pays $1,675/mo. This user will pay $2,075/mo for an interim rate and $2,332 for a final rate with outward Wats under A-3. Inward Wats will cost $2,710/mo under the proposed interim rate and final rate, AT&T said.

Proposed one-time installation charges were increased with a Wats line installation jumping from the present $54 to $183 for outward Wats and $227 for inward Wats.

### Moving Charges Up

The cost of moving a Wats line to another location within the same exchange will jump from the present $54 to $183 for outward service and $209 for inward service.

The proposed tariff changes are scheduled to take effect on Aug. 1, subject to approval by the FCC.

Even though AT&T filed the proposed rates in response to a commission order, it will still be carefully scrutinized, according to an FCC spokesman.

Several groups have already contacted the Common Carrier Bureau staff objecting to the increases which would have to be paid by certain Wats users. In some cases, the increases go as high as 30% to 60% over current rates, the spokesman said.

The deadline for petitions to suspend the tariff proposal is May 24. After that, the Common Carrier Bureau will make a staff recommendation on the proposed AT&T tariffs to the commission.

It is possible the staff will decide the rates of return set up by AT&T for the various Wats services are higher than were required in the original commission order, the spokesman said.

# DP Industry Doing Its Share?

*(Continued from Page 1)*

Honeywell works actively in various communities to help find jobs and training opportunities for handicapped persons. Each facility runs its own program, but a representative sampling includes the Jackson Mann School for the deaf, the Massachusetts Rehabilitation Center and a school for the blind, all in Massachusetts, according to a spokeswoman.

Honeywell also supplies work on a contract basis to sheltered workshops, the spokeswoman added, as well as providing training opportunities to some members of these workshops when they are ready to reenter society.

### Job Awareness Programs

"We also work with a school for the handicapped in a program where students are sent out to work one-on-one for a week with a Honeywell employee. The Honeywell person may not necessarily be handicapped, but he will be performing a job that a handicapped student could do, such as a desk job for someone in a wheelchair," she explained.

"This is designed to encourage the students, to let them know there are jobs they can do. They can then go back to the school and plan a course of study," she said.

Honeywell and IBM both have policies that allow leaves of absence for employees wishing to participate in various organizations.

For example, Elmer Bartels, a Honeywell manager of software development who is a quadraplegic, is on a two-year leave to serve as commissioner for the Massachusetts Rehabilitation Commission.

### IBMers on Leave

IBMers on leave are working at a variety of institutions including Gallaudet College for the deaf and the D.C. Institute for Mental Hygiene, both in Washington, D.C., the White House Conference on Handicapped Individuals and the Lighthouse (the New York Association for the Blind).

In addition to hiring employees with handicaps, several manufacturers have taken steps to ease their daily lives by building ramps and installing foot-operated drinking fountains for employees who cannot raise their arms, tape recorders for blind programmers, braille roto files for blind dispatchers and low-hung mirrors for those confined to wheelchairs.

IBM, for example, has also recorded the booklet containing employee benefits and participating plans on a Talking Book Record for its blind employees.

# On the Inside This Week

## NEWS

LEAA Suggests Methods to Eliminate DP Fraud ........ 4
Calif. Ruling Exempts On-Line Programs From Tax ..... 6
Air Force Denies Getting 370s Without Congress OK .... 7
Unusual 'Racer' Keeps Pace With Marathon Runners .... 8
Technology Credited as Spark of Distributed DP....... 11
Italy Asks CCITT for Volume-Sensitive Line Charges.... 12
DPer Takes Time Out to Train Deaf as Keypunchers.... 13
Freedom of Information, Privacy Advancing in Britain... 14
Majority of Sites Defenseless Against Calamities....... 15
*The Waves of Change:* A Book by Charles P. Lecht ...... 17

## EDITORIAL

Editorial: What's Really Going On? ................. 20
Human Connection: Independent Software Encouraged. 21
Taylor Report: Software Flexibility Advantageous ...... 21
Personality 'Shootouts' All in a DPer's Day's Work?..... 22
Survey Finds Users Best Served With Interface Unit.... 23
Program Aims to Fix Failure of Julian Date Formulas... 24

## SOFTWARE & SERVICES

Manager Should Check Software First.............. 25
File Analysis Leads User to Choice of Sort Package .... 26
T/S Service Helps Engineers Dig Into New Concept .... 27
File Handling Improved Under 'Foresight 5.5' ......... 28
Planning Enables College to Graduate to DBMS Use ... 30

## COMMUNICATIONS

Tymnet Unveils Ontyme as Data-Switching Option ..... 31
Telenet, ITT Jointly Providing Service Abroad ......... 32
PACX Dissolves User's Fear of CPU, Line Expansions .. 33

## TERMINAL TRANSACTIONS

Burns Ensures Its Own Security With Intelligent Units... 34
Siemens Brings Out Teleprinter; Telex Replacement..... 36

## SYSTEMS & PERIPHERALS

Distributed Processing Seen Lacking Understanding ... 37
Food Retailer Finds POS Conversion 'Not a Trauma' ... 38
Hospital Makes 'Smart' Move Toward Cardless Shop ... 41

## MINIWORLD

Dental School Caps DP Search With Mini............. 43
Company Finds Relief With In-House System .......... 44
Users Not Studying Cost Before Going In-House....... 45
S&L Finds Mini Eases Mortgage Workload............ 48
Sharp Bases Business Mini on Calculator ............ 49

## COMPUTER INDUSTRY

Business Demands Cobol on Large Minis ............ 51
GSA Sets Date for TSP Start-Up..................... 51
IBM's Leasing Strategy Undermined Memorex: Trial.... 53
Wangco Branching Out Into Broader Peripherals Mart.. 54
U.S. Services Gaining Abroad Despite Barriers........ 58
DP Industry Fares Well in Ranks of Fortune 500 ....... 58

# U.S. vs. IBM Turning Into an Appalling Numbers Game

**By Catherine Arnst**
Of the CW Staff

NEW YORK — May 19, 1975: Justice Department attorneys gave their opening statement today in the U.S. vs. IBM antitrust case being tried here. The suit was first filed in 1968.

May 19, 1977: Justice Department attorneys are finally drawing to the end of their direct case and a Labor Day finish is expected. IBM will then begin its defense case, which is expected to take at least the same amount of time.

The length of U.S. vs. IBM is appalling to almost all observers and there are numerous explanations for its voluminous nature. During the recent Senate Antitrust Subcommittee hearings [CW, May 9], witnesses testified that the trial was a disgrace and a lot of the blame was placed on Judge David N. Edelstein for not exerting greater control over the case and its conduct.

But the parents of the behemoth are multitudinous and one 67-year-old judge doesn't have to bear the total responsibility of the past two years.

Most stories on the case turn into a numbers game and for good reason: the numbers are staggering. During the course of approximately 320 trial days and 48,500 pages of transcript, 42 witnesses have completed their testimony (with three still pending). About 2,500 government exhibits have been received along with about 1,000 IBM exhibits.

As of April 29, 1,270 depositions were taken; 45 opinions handed down; and 100 memorandum endorsements, 21 pretrial orders, 23 stipulations, 10 amended pretrial orders and 14 orders were given during the course of the trial. In addition, there was one contempt order and one order to show cause.

As for the coming defense, counsel for IBM has presented a witness list of 353 names to the court and has already designated approximately 5,000 documents that it expects to use.

The numbers give a partial explanation of the length of this trial — no lawsuit with such a vast array of evidence could unfold in a short period of time. Even given the massiveness of the government's case, however, the pace of this trial is inordinately slow.

### Edelstein Criticized

Part of the fault can be laid at Edelstein's feet. He has been criticized for allowing every document to be submitted, no matter how trivial, and for not limiting either the direct or cross examination of witnesses.

His reasons are fairly obvious. By allowing everything to be admitted, he is preventing his decision from being overturned on appeal because he has limited both sides.

Also, until this past autumn, court was only sitting four days a week from 10:30 a.m. to 4:00 p.m., as Edelstein, who is chief justice for the Southern District of New York, had other administrative chores to attend to on Fridays.

In September, the hours changed to 10:00 a.m. to 4:30 p.m., five days a week, with documents being offered on Fridays, for which the judge does not have to be present.

Edelstein rarely takes a live witness on Fridays. Now that the government has basically completed the documentary portion of its case in chief, several Justice Department attorneys have complained that the only way to speed up the pace of the trial at this point is for Edelstein to sit longer hours.

The judge has recently indicated he would sit Fridays and even weekends, if necessary, to get the government's case completed by September.

But the largest impediment to expediting this trial is probably the almost complete lack of cooperation between the parties. Edelstein has noted several times for the record that he has never seen such contentious behavior between counsel for two adversaries in his experience.

Stipulations can take weeks to complete, documents are struggled over and, as Edelstein recently remarked, there has been more oral argument in this trial than in any case in the history of this country.

The basic lack of communication between the parties is incomprehensible to most observers. A case in point occurred May 10, when IBM attorney Max Shulman began taking the deposition of government witness John Bowmer, vice-president of First National City Bank of New York.

Evidently, the government attorneys were unaware the deposition would be taking place and had actually planned to drop Bowmer from their witness list — an intention of which IBM attorneys were unaware.

Court had to be stopped and a robing-room conference was held so lead government attorney Raymond Carlson could make an oral motion to strike Bowmer's name in order to prevent the needless deposition from continuing.

Each side, of course, faults the other for this and most incidents that arise from lack of cooperation, but Edelstein has accused both sides of behaving in a "babyish" fashion and wasting the court's time.

The other problem that besets this lawsuit and delays it is the turnover of manpower during the course of the trial because, as Carlson once stated, this case "wears people out."

## Analysis

The government is particularly plagued by the constant turnover in its staff. It hires mostly young lawyers (several on the staff now have only recently passed the Bar exam) and pays less than most private law firms.

In addition to losing its younger staff members, the government may also soon be losing the services of the one man who has been at the counsel table since the trial began — Raymond Carlson.

He has indicated to the court that he will step down as lead attorney for the plaintiff, to be replaced by Robert Staal. He is eligible for retirement this year and has a passion for tennis, so there is speculation that he will soon leave this case altogether for tennis courts in a warmer climate.

His departure could leave the government team in a shambles, however, and lead IBM attorney Thomas D. Barr has expressed concern to the court that the trial would be delayed while Staal and new attorneys he is bringing with him (up to 18, some reports said) become acquainted with the case.

Add the confusion resulting from such a large staff turnover to the enormous amount of evidence IBM plans to present during its defense and the continuing lack of communications between the parties. The result is many more number stories on this trial in the future.

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# Citibank Officer Says Mainframes Not Always a Must

*(Continued from Page 1)*

she said, explaining that the systems now installed at Citibank run everything from interactive Cobol programs to data base management systems.

The third myth — that minis are for "mini applications" — is also hogwash, she said, noting the bank's entire stock transfer operation is handled by one Interdata 8/32.

The fourth myth — that centralized DP organizations "save money on salaries" — was also disproved by Citibank's decentralization effort, she added.

"Out of 30 people from the DP department who were to be assigned as operators in the decentralized environment, we found only five had actually been operators. The rest were responsible for activities such as staging, set up, scheduling, production control, measurement, in-house consulting, application management, editing, managing and other control functions, she said.

With the decentralized system, "we found that three operators and a manager could control one minicomputer system pretty well," she said.

Further, the bank was able to eliminate two entire cost areas: I/O control and management support, she said.

Finally, the fifth myth — that a centralized system gives a company an economic way to get work done — is also untrue, she said.

"With a complex mainframe in a centralized environment, we undertook only two or three major projects per year. Of those, one failed and one was late," she indicated.

With the decentralized system, the bank can complete two or three dozen smaller projects per year, and most of them are successful, she added.

"Having control of your own system makes a big difference when it comes to installing something new," she said. There's no problem getting computer time for testing, she pointed out.

### Difficult Move

The bank's move to scrap the large system in favor of stand-alone minis was not an easy one, despite the fact it was completed in a "hectic" eight months, she said.

Ewen also admitted that at first the idea was hardly a popular one either.

The idea of programming such "toys" was greeted as an insult by many of the bank's DP staff members; some didn't want to have anything to do with it.

But costs were getting out of control and work backlogs were growing, she said. Service needed improving — the central system was too "volume sensitive" she said. And most critical, the bank's customers weren't happy.

After some investigation, the bank found that about 10 Interdata 8/32 systems working an hour apiece could get the same work done as one IBM 370/158 working one hour — with no apparent change perceived by individual user departments and at considerably less cost, she said.

User departments were given the freedom to choose the mini they wanted and outside consultants were hired to write software.

The bank ended up with equipment ranging from Burroughs to Wang, and just about everything in between, she said, adding perhaps in this regard the bank went a little overboard.

But despite a raft of nonstandardized systems, the bank estimated it saved 80 million after-tax dollars by decentralizing, she said.

The annual budget, which had been anticipated to rise as high as $400 million with a centralized system, was stabilized at about $240 million, she said.

And DP clerical staff was cut from about 10,500 to about 6,250, she indicated.

# Privacy Laws to Affect All Sites

*(Continued from Page 1)*

to the information he wants.

For example, a record may begin by stating that its first 10 bits give such background information on the individual as name, address and age. The next 15 bits may be allocated to medical information, and so on, Bushkin suggested.

One bit may be used to indicate which items in the record are in dispute, he added.

A second kind of "data about data" was referred to by Bushkin as "routing or traffic data." This information would tell the users of a system where the data that comprises the record comes from and where it is intended to go.

Routing or traffic data can be used to propagate corrections to record information, Bushkin said. It can also provide the individual with an accounting of the uses made of his record and the disclosures of his data.

While limited access to records on individuals is already considered to be "a good recordkeeping practice" and therefore has been instituted for many systems, traffic data is more a direct result of privacy legislation, Bushkin stated.

The odds are that good traffic information won't be kept in data bases themselves, he added.

Data about data as well as more fine grained access to records is needed and would evolve even if every user of data systems were 100% trustworthy, Bushkin contended.

"This is a natural evolutionary phase in the growth of recordkeeping," he said, adding these technical safeguards to privacy can be accomplished with a minimum of trouble if they are implemented gradually.

Specific implementation strategies are beyond the privacy commission's time and money resources, Bushkin noted. Besides, he said, he would prefer to see federal agencies free to choose their own strategies for instituting these safeguards.

Bushkin studied state, federal and international laws in addition to the commission's planned recommendations to isolate these emerging technical trends in information management for the commission.

Taken together, these trends say that "recordkeeping institutions bear an affirmative responsibility for good information management practices," Bushkin said.

This responsibility goes "well beyond" traditional security considerations, he added.

Too many people equate privacy with security, Bushkin stated. As far as privacy issues are concerned, security provisions should be aimed at the people who handle a system's records every day rather than at the sophisticated computer criminal, he said.

All institutions need to avoid technological overkill in protecting their systems from the one-time or infrequent violation by the criminal. Instead, they should place increased emphasis on administrative safeguards designed to reduce errors, omissions and dishonest use of access of records, Bushkin said.

# 'Edos' Update Designed for VS

*(Continued from Page 1)*

tion.

Partitioned Data Set (PDS) support, already implemented in Edos, is part of the updated version along with a programmer workstation facility, just being introduced to the current users.

An accelerated linkage editor — also an enhancement from a facility in Edos — is said to be faster than the comparable feature announced by IBM as one of the elements in its Advanced Functions package. Edos and Edos/VS gain their speed, TSCS claimed, because they issue far fewer READs than the IBM software.

All valid JCL statements in Edos, including Device Equate Support and Automatic Volume Sensing, are fully supported in Edos/VS, the company noted.

Edos/VS will provide support for up to 15 partitions, the spokesman said. The actual number is a function of the number of subtasks the user requires and the direct access storage device (DASD) unit the user selects as the Sysres device, he added.

Two basic rules determine the maximum number of batched partitions supported, he said. The sum of the number of subtasks required plus the number of batched partitions may not exceed 15. In any case, the number of batched partitions cannot exceed 10 if an IBM 2314 is used for Sysres, nine if a 3330 is used, six in a 3340 setting or 15 if a 3350 supports Sysres.

All of those devices can be supported in either a 360 or 370 environment, TCSC noted, since the parts of DOS/VS Release 34 written in "370-only" instructions have been rewritten for use with Edos/VS. The 370 instructions normally located in the resident supervisor have been eliminated where practical, replaced by 360-acceptable code that simulates the operation previously handled by the 370 instructions.

Final development of Edos/VS is subject to TCSC's acquiring a copy of IBM's Release 34, which the spokesman expects to happen "sometime in July." After that, field testing of Edos/VS is planned for late this year with general availability of the product seen expected in the second quarter of next year.

No price tag has been announced, but the company said it plans to be competitive with the $200/mo IBM will charge for its Advanced Functions-DOS/VS package.

TCSC is at 6517 Everglades Drive, Richmond, Va. 23225.

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# LEAA Manual Suggests Methods Of Cracking Down on DP Fraud

WASHINGTON, D.C.— A New York City bank teller milked $330,000 a day from his employer and its customers and plunked the money down for bets with his bookie until police uncovered the complicated computer fraud.

That's just one case cited in a recently released government manual that describes methods for detecting and prosecuting white-collar crimes, many of which involve the manipulation of DP systems.

The Law Enforcement Assistance Administration (LEAA) has sent the manual to several thousand state and local policy administrators and prosecutors to encourage a crackdown on fraud, con games, extortion, bribery and other crimes accomplished through deceit.

The 374-page investigation of White-Collar Crime: A Manual for Law Enforcement Agencies" manual includes a chapter on computers entitled "Computers: Tool of Crime and Investigative Resource." In addition to explaining to state and local police officers just what a computer system is and who tends to commit crimes using DP, the handbook encourages law enforcement agencies to pursue and prosecute these white-collar criminals.

Particular attention is paid by the LEAA manual to computer crimes because so many items — securities, bank accounts, accounts payable, credit ratings and other money substitutes — are stored within DP systems, the handbook explained.

The New York City bank fraud case underscored another aspect of computer crimes: Most come to light by accident or because a scheme runs out of control, not because of internal audits or company controls, according to the manual.

The "how-to" book was developed by the Battelle Law and Justice Study Center in Seattle, Wash., with $147,000 from LEAA. It was written by Herbert Edelhertz, a Battelle research scientist and former chief of the Justice Department's fraud section.

Available to the public, the LEAA manual can be obtained from the U.S. Government Printing Office, Washington, D.C. 20402, for $4.50 prepaid. The manual's stock number is 027-000-00507-1.

# 'DS/3000' Extends HP Mini Net

(Continued from Page 1)

are said to be transparent to the system's terminal users.

In program-to-program communications, users have a virtual terminal capability, allowing any terminals supported by and connected to a DS/3000-based system to operate as if they were directly connected to one another, a spokesman continued.

Users can also accomplish simultaneous local and remote processing, remote data base access, intersystem file transfers, communications interleaving, peripheral sharing and network control from a central DP facility if desired, he said.

In addition, within a DS/3000 network the accounting structure and file security features of MPE II provide protection against unauthorized system and file use. DS/3000 uses cyclic redundancy check characters and contains a diagnostic program for network testing, the company said.

The one restriction to this cross-processing between "relatively equal" HP 3000 systems in a network is the inability to inquire remote files from a local system, the spokesman noted.

The user must write a program at the local site, create a file in any remote system's data base and then access the new program, according to the spokesman. Remote file inquiry can also be accomplished by using HP's Key Sequential Access Method (Ksam).

DS/3000 operates under IBM 2780/3780 remote job entry batch communications protocol as well as BSC, HP said.

The distributed processing capability requires plug-in circuit boards. For dial-up or leased lines, each interconnection must have a synchronous single-line controller (SSLC).

In these modem links, users can obtain data transmission rates up to 9,600 bit/sec depending on line quality, the company noted.

The minimum system requirement is an HP 3000-II equipped with 192K bytes of main memory. Users of HP 3000CX computers can upgrade to the Series II processor with a hardware upgrade kit available from the company [CW, May 2].

DS/3000 will be available in June. The software carries a one-time charge of $9,000 for each system connected in the DS/3000 network, plus a $75/mo charge for maintenance, which includes software updates, status reports and a regular mail service in addition to a hot-line type of service.

The SSLC for modem links costs $2,000 per site and a hard-wired interface controller is priced at $2,300.

HP is located at 1501 Page Mill Road, Palo Alto, Calif. 94304.

# SSA Goofs

BALTIMORE — The Social Security Administration (SAA) recently sent checks to about 150,000 recipients at their latest given home addresses rather than to banks designated under the direct deposit program.

An SSA spokesman explained the mix-up occurred when one step was omitted in the reprogramming of a procedure for keeping records of direct depositors, according to an SSA spokesman. The reprogramming was being done to reconfigure the records, he added.

The estimated number of 150,000 represents a small percentage of the approximately six million recipients who have their checks deposited directly with a bank of their choice rather than receiving the payments at home.

In particular, the mix-up occurred in the files of those persons who had recently changed their status from disability to retirement, he said.

No effort is being made to stop payment on the checks since the agency has no way of knowing how many checks went to outdated addresses, he added.

The spokesman declined to estimate the dollar amount involved in the recent mailing mix-up.

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# Calif. Ruling Exempts On-Line Programs From Tax

**By Molly Upton**
Of the CW Staff

SACRAMENTO, Calif. — A California time-sharing firm need not pay use taxes on royalties for programs transmitted on-line to its computer, an attorney for the California Board of Equalization ruled here recently.

And the decision may apply to lease payments as well as this particular case which involved use taxes on royalties paid by Remote Computing Corp. (RCC) to out-of-state owners of software, according to RCC attorney Ryan Schmelz.

The opinion issued after a hearing with RCC hinged on the method of transmission of data.

If RCC takes delivery of any tangible media such as tape; then it has to pay use taxes on royalty payments. But if the data is transmitted on-line without any tangible media, then RCC is exempt from the use taxes according to state tax counsel Robert H. Anderson.

"The crux of the matter is the method used to transmit the program," Anderson said. "If tangible personal property is used in California to transmit [the software], there is a rental of the property in California subject to tax," he stated.

"The opinion was good," Schmelz said, "because I think the position of distinguishing between on-line vs. non-on-line transmittal of a program will apply uniformly whether we're talking about sales or use taxes or leases or purchases of software because the regulations are all under the sales and use tax law."

The state doesn't seem to distinguish between sales and use tax, Schmelz added.

A first step in the firm's effort to fight software taxes claimed by the state, RCC's hearing with Anderson was limited to the facts only. Schmelz plans to obtain a hearing before the full Board of Equalization on the legal issues of the tax.

"It is the physical possession and use of the magnetic tape itself, no matter how brief, and not the intangible information recorded on it that was transferred into the RCC computers for subsequent use by RCC through its computer system, that is being taxed," Anderson said.

### Program Already Resident

The ruling was issued as part of a finding that exempted RCC from taxes on royalty payments for its System-5 program stored in the firm's Burroughs Corp. B-5700 from May 1, 1975 to Nov. 1; 1975.

The reason for the exemption, Schmelz indicated, was that the program was already resident in the computer when the royalty payments began.

When RCC switched mainframes late in 1975, it acquired a magnetic tape of the program for its new system for which RCC became responsible for taxes, Anderson ruled.

The amount of taxes for which RCC was declared exempt is small in comparison with the $31,015 it had paid in use taxes on royalties to out-of-state software owners between January 1973 and June 1976, Schmelz said.

The RCC attorney argued unsuccessfully that the firm should not be assessed a tax on the new System-5 program it received for its different computer since it did not affect any tangible things happening until the firm made several on-line changes to it, thus altering the form of the program.

However, the hearing officer called that a "distinction without a difference," to which Schmelz replied that the principle of taxing software depending on its method of transmittal — remote or on media — also seemed a "distinction without a difference."

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A California publishing firm has literally taken the computer industry by storm with a recently-published "how to" proposal book. The book, a 4½ pound loose-leaf volume entitled *How to Create a Winning Proposal*, covers every aspect of proposal preparation from start to finish, including the nuts-and-bolts details on how a winner is put together.

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Copies are available from Mercury Communications, Inc., 730-CW Mission Street, Santa Cruz, CA 95060. $55 (pre-paid) includes 3-5 day delivery inside USA. In Calif. add $3.12. For outside USA, U.S. $67 (Int'l money order) includes 7-10 day air delivery.

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# Firms File Petitions in N.Y. Protesting Software Sales Tax

NEW YORK — At least two firms have filed petitions under New York State's Administrative Procedures Act (APA) protesting taxation on software sales.

Nova Computing Services, Inc.'s petition for a hearing challenges the validity of the New York regulations on taxing software. Informatics, Inc., on the other hand, is seeking a revision of its "letter of determination" — a state document indicating taxes are owed

Nova President Robert Sherin presented a petition arguing software is intangible and therefore not taxable under New York statutes at a meeting with Walter Hoffman, chief of New York State's Interpretations Unit, Sales Tax Bureau of the Department of Taxation and Finance.

The Nova petition asked the assessment, retroactivity, taxes, interest and any penalties concerning software under the regulations set forth Sept. 1, 1976 be declared void and invalid.

It also seeks to enjoin the state tax authority from collecting or issuing assessments on software.

"Any personal property, if used, is either intangible and/or an inconsequential element of a personal and/or professional information service in accordance with Chapters 28 and 29, New York Statutes, which exempt information services of a personal and individual nature," the petition stated.

The regulations are invalid because any tangible personal property used, such as media, is an inconsequential element of intangible software since it is "merely an intermediate input means of entering software into a computer on a one-time basis before it is transformed into its intangible end state of binary pulses," Nova stated.

Furthermore, "said rules attempt to take [a] software person's property without just compensation, contrary to the provisions of the Declaration of Rights of the Constitution of the State of New York and the Fourteenth Amendment of the U.S. Constitution."

Sherin explained that under the APA firms have the opportunity to challenge the rules or individual assessments.

### Wants Bill Reduced

Informatics is requesting revision of its letter of determination which indicates the firm owes a "significant amount" in sales taxes since 1973, according to Thomas Harincar, Informatics controller.

The tax appears to be on various phases of Informatics' business including packages, custom software and consulting, contract programming and a particular aspect of data services, he said.

However, he pointed out, the regulations of New York are vague, and furthermore the firm has received little documentation on which sales the taxes are being levied. "We're reasonably sure we were assessed on some sales not in New York," he remarked.

Harincar thinks the state tried to be overly greedy in taxing previous sales, which he termed retroactive taxation.

# DPMA Joins Software Tax Fight

CHICAGO — An association of users here has decided to oppose state sales taxes on software and services.

The Data Processing Management Association's (DPMA) Committee on Industry and Government Relations intends to fight the taxation on the grounds that software and services are intangible, according to George R. Eggert, DPMA's international vice-president of the committee.

### First Effort by Users

Although various industry groups such as the Association of Data Processing Service Organizations (Adapso) have, for some time, had special groups watching and fighting developments on the taxation front, the DPMA effort is one of the first by users.

The extent of DPMA's effort is unclear since the cost has not been ascertained.

The DPMA membership is quite interested in both the New York and Tennessee situations, he noted. The group will seriously consider funding moves to defeat taxes. "Hopefully, if we defeat it in one or two states, it won't creep up in others," he said.

The DPMA group has 13 regional representatives as well as a person to contact in each state who serves as liaison between DPMA and the local scene, he said.

### Meeting Scheduled

The Committee on Industry and Government Relations will meet in Jacksonville, Fla., on May 25-26 to discuss the software tax situation as well as the effects of the 1977 Privacy Act, he said.

Those interested in obtaining more information or volunteering aid should contact Eggert at DCASR, Chicago, P.O. Box 66475, O'Hare International Airport, Chicago, Ill. 60666.

# IBM Cuts 158, 168 Upkeep, Drops Some Memory Prices

ARMONK, N.Y. — IBM dropped maintenance prices on its 370/158 and 168 processing units at the same time it announced reductions on the purchase prices of these units and lowered charges for its semiconductor memory [CW, April 4].

As examples, price reductions of minimum monthly maintenance vary from $15/mo on the 2M-byte version of the 158, which formerly was $2,540, to $190/mo on the 4M-byte version of the 168, which was $5,690.

Prices were dropped on memory in excess of the basic system, a spokesman said. Thus the purchase price of a 370/148 with 1M bytes did not change, although the charge for a 148 with 2M bytes did.

## Correction

In "IBM Enhances DOS/VS With Update, Program Aid" [CW, May 9], the package from Software Pursuits should have been identified as DOS/MVT, which manages variable regions rather than fixed partitions.

## Project Ordered Canceled

# Air Force Denies Getting 370s Without Congress OK

By Edith Holmes
Of the CW Staff

WASHINGTON, D.C. – Gen. David C. Jones, Air Force chief of staff, last week denied charges that his branch of the Department of Defense deliberately went ahead with plans for a large-scale, integrated aircraft maintenance system without congressional approval.

At issue in part is the procurement of several IBM 370/168 systems – without authorization, according to charges by representatives John E. Moss (D-Calif.) and Charles Rose (D-N.C.).

Appearing before the House Defense Appropriations Subcommittee, Jones said the computerized system, dubbed "Project Max," was considered "Mission Essential" and as such was continued under appropriate congressional guidelines.

The general added, however, that the Air Force could have kept House and Senate members better informed about the system's development.

The hearings were part of the subcommittee's investigation of charges by Moss and Rose that the Air Force went ahead with Max, a part of its $800 million Advanced Logistics System (ALS), despite orders from the House and Senate Defense Appropriations Committees to cancel it in December 1975.

Originally consisting of three segments – an acquisition subsystem, a stock control and distribution subsystem and an aircraft repair subsystem – ALS was projected to cost over $800 million from its developmental beginnings in the early 1970s through 1979, Moss and Rose said.

### Memos Show Project Active

In recent letters to the congressional committees and to the General Accounting Office (GAO), the Office of Management and Budget (OMB), the House Government Operations Committee, President Carter and Secretary of Defense Harold Brown, Moss and Rose wrote that even though Congress had canceled the unworkable ALS, the Air Force has continued "substantial procurement" of the third subsystem for aircraft repair management.

The congressmen based their conclusion on documents generated within the Air Force indicating as many as 100 people are involved in the project. This internal Air Force correspondence showed work going on at Wright Patterson Air Force Base, Newark Air Force Station in Ohio, Hanscom Air Base in Massachusetts and Hill Air Force Base in Utah.

When testifying before the House Appropriations Subcommittee last week, Jones said 90 people were involved in Project Max, which is primarily located at the Utah base and promises to cost between $70 million and $145 million between now and 1985.

"Project Max will cost a small fraction of what ALS would have through 1979," Jones stressed.

Among the documents obtained by Moss and Rose was a memo by a two-star Air Force general who wrote to his aides, "I'm not overly concerned about 'unapproved' work on Max."

Major Gen. Robert L. Edge, Air Force assistant chief of staff for communications and computer resources, continued in the recent handwritten memo, "Seems to me we have the necessary degree of congressional support for everything but [the IBM]. 370/168s (which Congress doesn't know about yet). Why rock the boat unnecessarily?"

At Senate Appropriations Subcommittee meetings last week, Sen. Thomas F. Eagleton (D-Mo.) accused Edge and the Air Force of "gross deception" and called the general's explanation of his role in Project Max "the most disgraceful testimony I've ever heard in the Senate."

In answer to Edge's assertions that his notes were "memory joggers" for a discussion with an Air Force subordinate, Eagleton shouted at the general, "Do you think we should sit here and give one-half an ounce of credibility to the garbage you have given the committee?"

### 'Classic Exhibit of Contempt'

Moss and Rose called the Edge memo and the Air Force actions as a whole "a classic exhibition of contempt here on the part of the Air Force for the Congress, its mandate and prudent use of taxpayer dollars."

The status of the Air Force efforts to procure the 370/168s remains uncertain. Questioned about the machines during the House Appropriations Subcommittee hearing, Everett T. Keech, assistant secretary of the Air Force for financial management, said interest in acquiring the mainframes grew out of IBM's 1976 decision to terminate support of IBM 7080s, an Air Force computing staple, as of December 1979.

However, he added that the Air Force plans to keep its IBM 7080s and Control Data Corp. Cyber systems for the present. Any move to acquire new systems would be competitive, Keech said.

Jones maintained in his testimony before the House members that Project Max is primarily designed to be a uniform cost-accounting system, although he acknowledged "there are other parts of Max that I don't fully understand yet."

The general defined a project known as "Mini Max" as "a data automation project designed to keep track of gyros."

A. Ernest Fitzgerald, the Air Force management executive who was fired after bringing attention to the ballooning cost of the Lockheed C-5A cargo plane, contended in the documents obtained by Moss and Rose that Project Max is really a system "for justifying costs rather than controlling them."

Reinstated in his old Air Force job as a result of a Civil Service Commission order, Fitzgerald repeatedly raised objections to Max in internal memoranda. He questioned its legality in addition to its logic and effectiveness.

Mini Max was a small version of Max that was tried out at the Newark Air Force Base and shown to be a dismal failure, according to Fitzgerald.

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### Together With Minicomputer

# Unusual 'Racer' Keeps Pace With Marathon Runners

Honeywell's level 6 computer is timing the BOSTON MARATHON.

BOSTON — One "Racer" in this year's Boston Marathon started a few hours late, but reached the finish line with winner Jerome Drayton.

Racer — the Runner Administration and Computerized Entry Routine — is a computer program that has enabled Boston Athletic Association (BAA) officials to administer and time increasingly larger fields of Marathon contestants. Racer runs on a Honeywell Information Systems, Inc. minicomputer that begins to provide information on the competitors as soon as the first runner crosses the finish line.

Recording finishing times has been the biggest administrative challenge during the last few years of the Marathon's 81-year history. When 10 to 30 or more runners begin to cross the line at the same time, it becomes impossible to record times manually, so HIS has worked with the BAA for the past three years to solve that problem and assist with other DP tasks.

This year the challenge was greater than ever with a record 2,317 entrants finishing the race within the four-hour time limit — along with scores of unofficial runners. HIS used one of its Level 6 minicomputers, which can measure time electronically in billionths of a second, to help record finishing times.

**Problem Overcome**

The problem is transferring information into the computer quickly and accurately enough — a physical rather than an electronic problem — to get the runners listed in correct order.

In this year's Marathon a scorer was stationed just outside an HIS truck which housed the minicomputer. He held a special plunger-type key that was wired into a minicomputer terminal inside the truck..

Each time a runner crossed the finish line, the scorer hit the key. (Previous tests had shown it was possible to do this 13 times a second). If 30 people crossed in one minute, he hit the key 30 times, recording 30 finishing times for that minute to the nearest second.

Runners were then directed into one of four shoots and handed a card indicating the order in which he finished during that particular minute.

At a checkout station at the end of each shoot, each runner's number was listed with his finish time. Someone else stood in for anyone who finished but collapsed before reaching the checkout station.

The identification lists were verified by BAA officials and entered into four HIS terminals located in nearby Prudential Insurance Co. offices.

The terminals communicated the information over telephone lines to another HIS computer — a Multics system at the company's Billerica facilities for which the Racer program was written in 1975 and in which other information on the competitors had been stored prior to the race.

The Multics system then matched the runners' names in order with the times communicated to it by the Level 6. It automatically deleted the times of any unofficial runners who went through the checkout stations and began to produce the list of finishers and a variety of other reports on a printer at the Prudential Center.

# Mini Pendulum Seen Swinging

CHICAGO — The trend toward distributed data processing will continue, but the pendulum of change will probably swing back toward centralized data processing, according to members of a panel at the recent Computer Caravan here.

The final solution, the attendees of a session on "Applying Minicomputers" were told, will depend upon the individual application and needs of the end user. It is not a question of whether centralization or decentralization is best, but which is better for the individual user.

"The pendulum will keep swinging and will continue to reflect the philosophy of the moment," Steve Dukker, president of Dedicated Systems, Inc. here, told the session. Dukker was Tuesday's keynote speaker.

It is currently cheaper to have distributed minicomputers than it is to have communicating terminals and a huge mainframe, Dukker noted.

"However, that may not always be true. Distributed data processing as opposed to centralized is a cost-effective alternative."

"The pendulum of trend between distributed DP and centralized DP is swinging and will continue to swing as individual needs and applications arise," Peter Strell, a consultant at Dedicated Systems, concluded.

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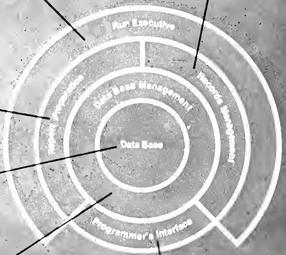

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# Technology Credited as Spark Of Distributed DP Revolution

**By Frank Vaughan**
Of the CW Staff

CHICAGO — Technology is the cause of the distributed data processing revolution, according to the keynote speaker at the recent Computer Caravan here.

Computers are getting "smaller, cheaper and more powerful" and "technological revolutions" are occurring every three or four days, Steve Dukker, president of Dedicated Systems, Inc. and keynote speaker, told the Users Forum here.

"The magnitude of these cost/performance improvements is astounding. Systems of today with the power of the equipment of the late '60s are available at a fraction of the earlier system costs," he said.

"A mass storage unit capable of storing 300M bytes is available at OEM costs of under $10,000 compared with 10 times that cost just five years ago.

"The technological revolutions supporting these price and performance advances are, if anything, accelerating in the light of improved production techniques and new conceptual breakthroughs. The end is not yet in sight," he predicted.

The definition of minicomputers is no longer tied to system performance or power of hardware or peripherals, Dukker said. Minis are more precisely defined in terms of direct factors such as software reliability and capabilities, organizational (vendor) support and standardization.

The technology sits "like Buck Rogers in the present" with capabilities beyond the current general commercial requirements, Dukker said. The software, however, "is still in adolescence," presenting a problem for the large corporation.

### First Success

The first successful uses of the mini in the general commercial environment was in the small business sector, Dukker recalled.

"First we had the OEM taking basic equipment with little software flexibility and devloping, 'turnkey stand-alone systems' designed not to be generally applicable to business or simple to modify," he said.

Then the small business system packagers — like the Basic Fours — came along. They took available hardware and built upon it the software support to develop general commercial systems for the small business user, he noted.

The manufacturers themselves came late into the arena of commercial software support, and this support most often represented vendor-specific modifications of existing software support developed for their traditional products, he said.

"We see Basic (nonstandard), Fortran IV (standard but not terribly effective), commercial Fortran (nonstandard), RPG, restricted Cobols and other machine-specific, rather unique tools," Dukker said.

"In light of these events, we are seeking a major shift in the logistics of large corporate systems support," he noted. "Minicomputers are making this happen."

Minicomputers are allowing certain management goals and objective strategies for implementing distributed data processing. These include:

- Assigning costs at the lowest level of organizational structure possible.
- Maintaining uniform corporate systems in a geographically dispersed environment.
- Permitting more effective autonomous management at the operational levels.
- Permitting more extensive mechanization of clerical "grunt level" systems, freeing more hour resources for more effective projects and tasks.
- Giving a more flexible environment from which to capitalize on new technological advances.
- Permitting more manageable system growth in hardware and allowing improvement of system support by bringing tools closer to the end user and in general giving DP a better image.

In the area of technology, Dukker expects continued acceleration of technological advances and growth in both mechanical and electronic areas.

## Morris Named to EFT Post

WASHINGTON, D.C. — Russell D. Morris has been appointed to the National Commission on Electronic Fund Transfers (EFT) to serve as the commissioner representing the U.S. Postal Service.

Morris, general manager of financial planning in the office of the treasurer of the Postal Service, replaced Richard F. Gould, who resigned from the Postal Service and the Commission to return to the private sector.

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**June 6th — Preview Issue:** A complete rundown of the companies, products and services, keynote speakers and technical sessions you'll see at NCC. (If you forget to bring your copy of *Computerworld*, don't worry. Free copies will be available at our booth.) This issue can help you pinpoint what's of interest to you before you attend, so you can make the most of your time there.

**June 13th — Show Issue:** The Show Issue will include all the late breaking stories, program changes, intended product announcements and behind the scenes show details leading up to NCC. (It will also be available at our NCC booth.)

**June 20th — Wrap-Up Issue:** Cohesive analysis and summary of the significant events of the '77 NCC. This issue will give details on product announcements and will review the content of technical sessions, expert's observations and keynote speeches. If you have an interest in what goes on at NCC, don't miss it.

If you're a manufacturer or marketer in the computer field, don't miss these ad closing dates for *Computerworld*'s NCC issues:

*Preview Issue* (June 6th) — Color and insert close: May 20; B&W close: May 27.

*Show Issue* (June 13th) — Color and insert close: May 27; B&W close: June 3.

*Wrap-Up Issue* (June 20th) — Color and insert close: June 3; B&W close: June 10.

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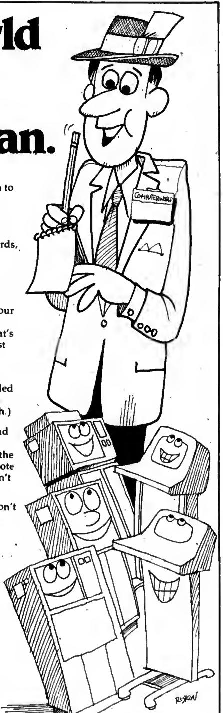


# Italy Asks CCITT for Volume-Sensitive Line Changes

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Italy wants to switch from flat monthly charges to volume-sensitive rates for leased private lines — a move that would drastically increase international telecommunications costs — and at least two other European nations have indicated they like the idea.

The Italian contribution to a recent meeting of the Consultative Committee on International Telephone and Telegraph (CCITT) in Geneva, Switzerland, held the potential for stunting the growth of such volume-sensitive telecommunications services as packet switching, U.S. CCITT members agreed.

Many U.S. users of private leased circuits abroad, including General Electric Co., members of the Association of Data Processing Service Organizations (Adapso), the airlines and the U.S. government, want this service retained at a flat rate because they have spent a great deal to upgrade the transmission qualitiy and capacity of these lines. The Italians want to cash in on these improvements without offering additional service.

Prior to the April 27-May 3 CCITT meeting, France and Belgium indicated their support of the Italian proposal and representatives from the two countries suggested other European telecommunications administrations would probably advocate revision of the tariff system for private leased circuits.

The Italians have asked the CCITT to conduct a study of flat rate vs. volume-sensitive charges for private lines.

### FCC Meeting

In an April 14 meeting at the Federal Communications Commission (FCC) here, the U.S. CCITT members aired their views on the Italian proposal and received the promise that the U.S. delegation to CCITT would do "anything necessary to retain leased channels with transparent facilities at flat monthly rates."

Not wanting to be precluded from the rate structure study, the U.S. delegation went to Geneva prepared to oppose the underlying assumptions of Italy's recommendation but, open to the possibility of an objective review of the costs that a change from flat to usage-sensitive rates might involve.

Few studies have been done in this area, but according to Pan American Airlines, an organization that has studied the 10-mile, 100-mile and 300-mile voice channel rates throughout the world, the rates vary widely.

For example, Pan Am found monthly charges for 10-mile voice channels range from $20/circuit in South Africa to $1,200/circuit in Thailand. This same circuit can be leased in the U.S. for $64, in Italy for $233 and in Germany for $545.

The 100-mile voice channel goes for $148/circuit in the U.S. and for $2,046/circuit in France and Germany.

Prices for the 300-mile voice channel begin at $270/circuit in the U.S. and go all the way up to $2,592/circuit in Sweden and Germany and to $3,000/circuit in Thailand, the Pan Am study found.

### Italy's Viewpoint

The thrust of the Italian proposal is "to bring the rates from different telecommunication services, as far as possible, into line," according to the paper Italy submitted for CCITT review.

The flat rate charge for leased circuits "seems out of date now" when compared with the tariffs for other telecommunications services, be they telephone and Telex or data transmission and packet switching, the Italians said.

Italy maintained that flat rates for point-to-point circuits were established primarily to relieve Telex exchanges of increasing volumes of traffic. While this goal was achieved, "over the years the result has been a growth and proliferation of multiple-use circuits and private networks which are getting out of control," the Italian administration charged.

The Italians would revise the tariff structure "so that users are discouraged from setting up private networks at random and from going in for multiple use."

### 'Critical Consequences'

If Italy's CCITT proposal is adopted and implemented on an international basis, it will have "critical economic consequences for major U.S. industrial users of international private-line services and data processing services vendors, Brendon A. McShane of GE wrote to the U.S. State Department's Office of International Communications Policy before going to Geneva.

Any new data services can be priced on a usage-sensitive basis, McShane added. Private lines can continue to be leased at flat rates, and then governments can sit back and let economics and technologies battle it out, he suggested.

It is because private lines are leased at a flat rate that data services companies with international networks have "the incentive to spend money on equipment, software and research and development in order to perfect ways of increasing the circuit's capacity to carry high-grade and virtually error-free transmissions," Herbert E. Marks, counsel for the Remote Processing Services Section of Adapso, told the State Department and the FCC.

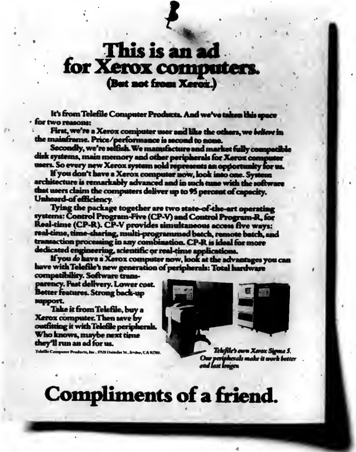
Volume-sensitive pricing for these circuits would have "a serious, detrimental effect on the continuation and future development of remote access DP networks and on the U.S. companies that offer these services," Marks stated.

"The proposal is a threat to technological development in information technology, to the encouragement of the free flow of information and to the interests of the U.S.," he said.

The Computer and Business Equipment Manufacturers Association (Cbema) agreed with the airlines, GE and Adapso in their opposition to the Italian proposal. President Peter F. McCloskey added in his letters to the State Department and FCC that Cbema views the proposal as part of "an increasing impetus, particularly in the European area, for a revised pricing structure" based on private-line usage.

The U.S. Office of Telecommunications Policy (OTP) also put Italy's move in the context of "a growing sentiment" within European administrations that they want more revenue out of private-line services.

The increase in operating costs that would result from usage-sensitive pricing would be "particularly troublesome to those users who have already adopted circuit or network usage schemes in which the costs of multiplex or switching equipment that permits heavier use of a given channel capacity are offset by known, unchanging line costs," William L. Fishman, assistant director of OTP, wrote to the State Department.



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Recently, we announced a new mass store facility that brings "Winchester" disk drive technology to Xerox users – something previously available only to IBM users.

Telefile has even taken over complete system maintenance at some sites. Our service network now stretches to over 20 cities and it's growing monthly.

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## User Community Enthusiastic

# DPer Takes Time Out to Train Deaf as Keypunchers

**By Toni Wiseman**
Of the CW Staff

NEW YORK — Computers are thought of as grey, emotionless machines, but some of the people who work with them can give you a warm feeling through their efforts to help others.

This is the feeling you'd get from Beth McEndy, systems analyst manager at Univac's Northern California Data Entry Branch. For the last two and one half years McEndy has been running classes on her own time to train deaf individuals as data entry operators.

She first became interested after attending a retreat at a deaf center in San Francisco. There one of the speakers who had emphasized the need to get deaf people into the working community mentioned keypunching as a realistic opportunity.

Since Univac makes a key-to-disk system, McEndy told the speaker that if he would supply the students, she would supply the time and machinery to train them.

Today, 25 graduates later, McEndy can boast 100% employment of her trainees — "and they're not necessarily working on Univac equipment," she said.

Many of her students are referred from a private placement center, Silent Strength, run by Eddie Juaregui, himself partially deaf.

The students attend classes two hours a night, four nights a week for six weeks, McEndy said. Univac's Computer-Aided Data Entry (Cade) system, which has a computer-aided instruction (CAI) course as part of its standard software, is used in the course since its interactive mode is perfect for training people who cannot hear.

A programmed instruction course on Cade is used in conjunction with the CAI, she added.

Silent Strength also supplied McEndy with a sign language interpreter so if there were any questions from the students they could be explained further, "and I'm slowly but surely learning sign language," she said.

### Strong User Response

McEndy is particularly pleased by the area users' response to the program. "We've been raiding our customers, asking them if they need operators, and they've been extremely good about taking people out of the class," she said.

One user in particular, a retail chain, has a big increase in business around Christmas; last year it hired nine operators out of the class that graduated in early December.

"It's a good six to eight weeks' work, so by the time they come out they're fully trained and able to go into the community," McEndy stated, noting the store paid the operators regular wages for their on-the-job training.

"We're getting more and more people coming to us for operators. In fact, I have jobs now for six to nine people, as soon as I get them trained, so the responses have been really encouraging.

"And now with [Health, Education and Welfare Secretary] Califano's decision [CW, May 9], it can't help but help us in our efforts," she observed.

### Less Handicapped

"People are sometimes uncomfortable around the deaf," McEndy said. "Some don't speak clearly depending on when they lost their hearing."

But some deaf people are "less handicapped than some people I know who have all their senses," she stated, noting that one of her graduates had been on welfare for five years and is now out working and making a living.

"And when we help him and others like him, we're also helping the community in that we're getting people off the welfare rolls who are really capable of working," she said.

The community, in return, is helping McEndy. When she asked for help at the last Cade users group, the response was so great that she now teaches only one week of the course. The woman who has been assisting all along teaches one, and users take over the other four.

"People are getting less and less uncomfortable around the deaf as they realize they are willing to work and make terrific operators, because obviously their attention span is taken up with what they're doing. And since there are no distractions, their speeds can sometimes far exceed a hearing operator's," McEndy said.

While the course has been McEndy's private project, she emphasized Univac's support in terms of giving time on the machines and the equipment itself. In addition, several other Univac branches around the country have expressed an interest in starting similar groups in their areas, she said.

"What I'd really like to see now is some of the money out of HEW for special education get assigned to doing this type of thing. It is a perfect fit and anyone who can work a terminal can use it," McEndy said.

# 'Hit' Shows Value Of Keeping Warrants On File, NCIC Says

HOLMDEL, N.J. — The recent arrest of an individual here who was wanted for murder for nearly 10 years justifies the practice of retaining outstanding warrants more than just a few years, according to officials of the National Crime Information Center (NCIC).

The arrest occurred one evening when a police officer stopped a motorist for operating a vehicle with only one working headlight.

An inquiry into the Federal Bureau of Investigation's computerized NCIC via the New Jersey Criminal Justice Information System resulted in a "hit."

According to the NCIC, the driver was wanted by Alabama authorities on murder and armed robbery charges dating back to 1968.

The man was taken into custody after Alabama officials confirmed the hit. Subsequent investigation revealed the driver was wanted in New Jersey as well as several other states for a variety of criminal and motor vehicle charges, according to the NCIC.

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It's an unsolicited testimonial from Telefile Computer Products. And we've taken space again for two reasons:

First, for sheer number crunching and handling of large data bases, Univac computers are in a class by themselves (how else could they thrive under a quarter century of IBM competition?).

Secondly, there are hundreds of *older* Univac installations that could benefit significantly from Telefile's computer enhancement capabilities.

Key to Univac's success has been its evolutionary approach to systems design. The new 1100 Series machines are direct descendants of the Univac 1108, first installed in 1964 and still running strong.

But as 1108's and other models have grown older, remarkable evolutionary advancements in memory, peripheral and mass storage facilities have grown up around them. One way users could upgrade was to change out the mainframe into a gleaming new model. Univac makes it easy by keeping the software compatible.

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Take our new fully compatible add-on memory for Univac computers. By taking advantage of latest technology, it runs faster, takes up less floor space, and runs on only one-third the power of the Univac memory it replaces. No software changes are required. And costs *are cut about 70 percent.*

We currently offer unitized memory for 1110, 1100/40 and 1106 processors; and multi-modular memory for Univac 494, 1106, 1108, and 1110 processors.

Both memory types are currently up and running on Univac computers. On one, overall system throughput has been boosted by a remarkable *30* percent!

But this is just the start. Coming down the line are a solid state drum replacement and disk systems that leapfrog 3330 technology. Not to mention some other exciting developments we'd rather not mention right now.

We don't expect Univac to run an ad for Telefile, but someday the users might.

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*Telefile's Univac-compatible memory (left) saves money, power and floor space.*

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# Freedom of Information, Privacy Advancing in Britain

By G. Russell Pipe

Special to Computerworld

LONDON – "Making trust a two-way street" is the theme of a freedom of information (FOI) drive underway in the House of Commons here.

The significance of the efforts of an All-Party Parliamenlary Committee for FOI and an FOI campaign organization is not that they will achieve early legislative success, but that a number of signs point to positive results down the road.

An omnibus FOI and privacy bill introduced in February by Tom Litterick, Labor Party member of Parliament, is now before the Machinery of Government Study Group and is expected to come up for general debate soon. The measure is a combined draft of the U.S. FOI and Swedish open records laws.

### Proponents Optimistic

Proponents believe legislation should have wide appeal because the spirit of access to information has precedents in "the bulwark of so-called Western capitalism and the shining example of liberal socialism."

The 1911 Official Secrets Act is now law. This law puts the "lid on" nearly all records and documents not officially published by the government.

The requirement of withholding information seems to be the most severe in Europe and, when coupled with the tradition of a powerful civil service, is a significant hurdle for supporters of open information to overcome.

### Credibility, Interest Boosted

The Trade Union Council Labor Party Liaison Committee has endorsed FOI principles, which has boosted the credibility of the issue in the present government.

Demand by news media and the National Council for Civil Liberties for access to official records have been repeated during recent years and have increased public interest in the issue.

Further, the Data Protection Committee, charged with proposing action to implement a government White Paper on establishing rules over computerized personal information systems, is taking evidence on similar provisions as are incorporated in the bill.

The Royal Institute of Public Administration has taken up the question of access to public records, which on its face, is a positive development.

### Publicly Available Indexes

One innovation in the bill is the requirement that all government agencies "establish and maintain publicly available indexes of categories and individual file titles of official information in its possession or charge which shall be sufficient to rapidly identify and locate all such official information."

Monthly updating would be required. For personal files, general public notification of the existence and character of systems would be called for.

The All-Party Committee indicated it has incorporated both FOI and privacy legislation "in the same package because it is relevant to legislative economy [and] clarity of legislative intention and the two concepts should be dealt with in one blow.

"As the Government has already accepted the need for privacy legislation in the field of computer technology, this realistic recommendation has already been suggested to the home secretary by the Data Protection Committee."

### Attacked by Litterick

Litterick has severely attacked the act. "For all these years Britain has been subjected to the suppressive use of this act in a manner which never occurred to those who permitted the act to slip through Parliament," he said.

"Its main use has been to conceal the discreditable actions of those in authority and to prevent the electorate and Parliament from knowing information that might embarrass those who wield control over our lives.

### Secrecy Hides Problems

"There is no real need to suffer in peacetime the hardships of war; an economic decline is no accident. Official secrecy hides from view the real source of many problems which affect our lives adversely," he stated.

Some observers feel the tender political balance in Britain today, the support of open records by the trade unions and pressure for more open information on Scottish and Welsh economic prospects by proponents of devolution will create conditions to expedite the FOI campaign.

The realists are counting the years, not the days, before this is achieved.

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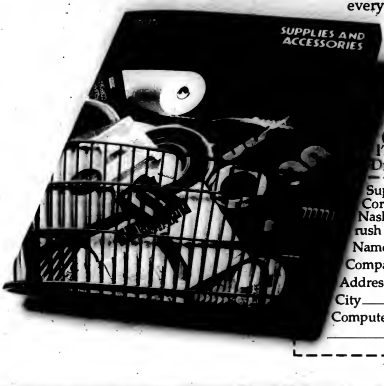

# Majority of U.S. DP Sites Seen Defenseless Against Calamities

SAN FRANCISCO — The majority of DP centers in this country are easy targets for fraud, embezzlement and sabotage, Louis Scoma Jr. charged at the 5th National Data Security Seminar here recently.

They are also vulnerable to being destroyed through disasters such as fires, floods, tornadoes, hurricanes and earthquakes, the DP security expert stated.

Scoma, president of Data Processing Security, Inc., a Texas-based national computer security consulting firm which sponsored the seminar, said most companies operate under a sense of false security.

"Many managers believe their DP centers are protected, when they are not," he said. "This is because the state of the art in computer security systems is constantly changing in areas such as physical and data security, fire protection, DP auditing and disaster-recovery programs."

### Physical Security

Commenting on physical security, Scoma said buildings or rooms should be designed exclusively to house computers and DP functions. "Today, many centers, especially those installed in the past, have been assigned to whatever space was available at the time," he said.

Many companies have recognized the problem and are relocating to remote locations where they can exercise more control over enforcing stronger security measures, he explained.

When a company moves its computer center from one location to another; that company should leave the raised floor, air conditioning and power in the area formerly housing the computer center to support any emergency recovery plan, he suggested.

This will enable a company to have a backup site readily available to minimize computer downtime if it has to install an auxiliary computer, he explained.

Regardless of where they are located, DP centers, should be placed off limits to unauthorized personnel, Scoma warned.

A number of devices on the market are designed to restrict unauthorized entry, ranging from a sign on the door reading "Authorized Personnel Only" to plastic coded badges to fingerprint, hand and even voice readers.

He noted however, that some devices are more effective than others.

### Theft-Detection Devices

Theft-detection devices are available to protect information stored in disk and tape libraries. These devices sound an alarm or a signal when tapes or disks are removed from the DP center.

To protect data on tapes or disks from fraud or embezzlement, companies need to incorporate special security measures into their programs, Scoma indicated.

"In the past, programs have been written to generate timely and accurate information for management, but did not include security measures," he said.

Today, progressive companies are implementing standards and controls in the design and programming phases, providing more sophisticated data integrity.

Fraud and embezzlement through a computer can go undetected not only because of lax DP auditing procedures, but because many internal auditors lack the necessary skills required to police the data processing function, he added.

Staffing for the DP audit function can vary from internal auditors to the team concept with internal auditors and DP professionals working together.

Other possibilities include assigning DP auditing to experienced DP personnel on a rotational basis.

Disasters resulting from sabotage, tornadoes, hurricanes, floods and earthquakes pose a serious threat to DP centers.

"Unfortunately, an estimated 95% of the companies in the nation are not prepared to recover if they were to lose their computers," Scoma said. Most companies have never tested their recovery plans for effectiveness, he added.

To minimize confusion and losses after a disaster, emergency on-site procedures should be established, essential systems and documentation should be backed up at off-site locations and personnel should be trained in what to do in case of a disaster, Scoma suggested.

Companies can determine what the chances are of a crime or disaster occurring within their DP centers and what it would cost to design a security program by conducting a risk analysis.

"However, it is estimated only 200 companies in the country have conducted a formal risk analysis of their computer security programs," he said.

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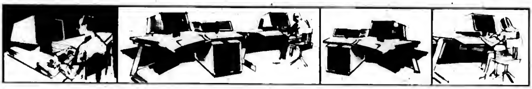

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# The Waves of Change

## By Charles P. Lecht

*With all signs pointing to strong growth in the DP industry, Lecht this week discusses marketplace trends and explores the areas that most need optimization by DP vendors.*

### CHAPTER III

All market indicators clearly point to a powerful trend: continuing, vigorous growth in nearly all segments of the computer industry.

The value of installed computer equipment is expected to nearly triple over the next 10 years. The 1976 International Data Corp. (IDC) survey of user spending for hardware over the near term indicated an increase of approximately 17% in 1976 compared with a 12% increment in 1975. (Growth in the software sector has been discussed at some length in Chapter II.)

At the same time, the nature of the computer industry is changing dramatically; general-purpose systems in many sectors of industry are increasingly being viewed as "no-purpose" because of the high degree of specialization taking place in product offerings.

Thus, for example, general-purpose computer shipments, especially of the IBM 370 series, should peak in 1977 and then begin to taper off in anticipation of new IBM offerings in the 1978-79 period, specifically of System/80.

While this fact alone does not substantiate the no-purpose postulate, it is what is replacing it in similar technologies that leads us to our conclusions. The industrially/-functionally oriented processor is becoming a reality, however unclear it may be at this point in time. It will, however, not obviate the need for continuing production of general-purpose systems for a long time to come, especially in the large class.

### Typical Product Cycle

Figure III-1 shows the typical product cycle for the IBM 360, 370 and part of the pending System/80 era. The IBM System/360 era began actively in 1966 and ran for about six years. The 370 era (see Figure III-2) was temporarily stalled in 1970-71 because of the recession and then effectively relaunched in 1972 with the announcement of Virtual Storage (370/VS) systems. This "era" is expected to last until 1979-80.

The peak of System/360 shipments occurred in 1969-70 with approximately 18,000 units shipped, while System/370 shipments should have peaked by the end of this year, with a subsequent rapid decline in 1978-79. It may be observed that the product cycle for each major system generation has lengthened from six years (for 360) to seven years (for 370) and is projected to expand to eight years for the pending System/80.

Worldwide shipments of U.S.-manufactured general-purpose systems (Figure III-3) should approach 35,000 units between 1977 and 1978 with an installed (if sold) value of more than $12 billion in 1977 and nearly $15 billion in 1978. It is worth noting that this remarkable set of figures does not even take into account the shipments of mini- and microcomputer-based sytems and terminals.

Worldwide terminal shipments of all types (Figure III-4) surpassed the one million unit mark in 1975 and are expected to exceed 4.5 million units in 1980 and reach roughly eight million to 10 million by 1985, provided current trends are maintained. This represents an average of approximately 6.5 terminals per system in 1975 and nearly 15 terminals per system in 1980.

It is estimated that 40% to 45% of all the terminals shipped in 1975 were "applications-specialized" in view of their intended specialized usage as point-of-sale (POS), electronic funds transfer, retail, supermarket, brokerage terminals and so on. The other 55% to 60% were considered "general-purpose" terminals of all types.

It appears probable that applications-specialized terminals will achieve quantitative dominance by 1980, with 50% to 55% of all those installed falling somewhere in this category.

Figure III-4 also shows that approximately 155,000 computers of all types including minis (but excluding microcomputers) were installed by year-end 1975; this volume is projected to nearly double to 300,000 units in 1980. Assuming that the major manufacturers can solve software bottleneck and training issues, one can extrapolate (if current trends continue) to a total of nearly 500,000 such systems installed by 1985.

By 1975, there were an estimated 95,000 customer sites, which represents an average of 1.5 computers per site. There should be at least 160,000 sites (or nearly two computers per installation) by 1980. The number of user sites should approach 240,000 worldwide by 1985.

Certain competitors are not participating in some of the high growth areas; for example, IBM and Univac were not active in the minicomputer or OEM mini category (although IBM started to become more active in early 1977 with its new Series/1 line).

So far in the important communications multiplexer/concentrator or nodal processor category, Univac, NCR and International Computers Ltd. appear to lack products, although Univac has introduced one recently; and in the large-scale computer class — IBM 370/158- and 168-type machines — NCR has only recently announced an entry, while the Digital Equipment Corp. Decsystem-1099 or 2050 only reach up to about the IBM 158-3MP performance level.

In applications-specialized or POS terminals, Honeywell and DEC are viewed as nonparticipants. Furthermore, very few of

(Continued on Page 18)

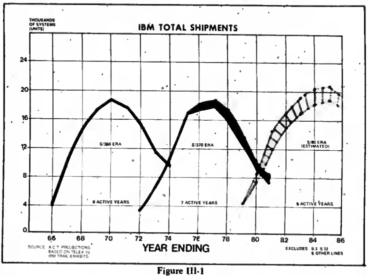


Figure III-1

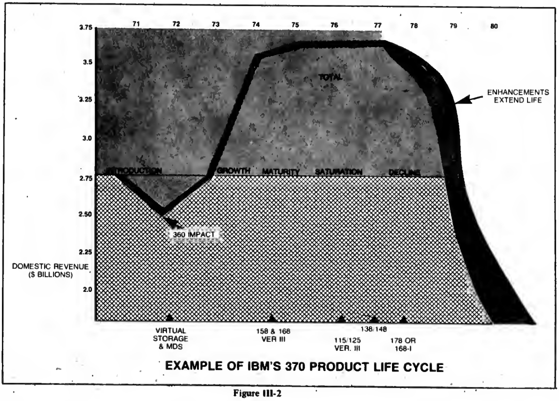


Figure III-2

# Excerpts From *The Waves of Change*

*(Continued from Page 17)*

the major computer manufacturers offer microcomputer boards or IC components for sale.

Each computer manufacturer is confronted with a decision as to which markets suit its abilities and goals from the standpoint of growth rates, profit margin potential and the "penetrability" of these specific market areas. Figure III-5 shows the approximate annual growth rates vs. profit margins for each of the major classes of components, terminals and systems offered in the industry today.

Software and applications services represent a very high growth rate area with above-average to excellent profit potential. Minicomputers which are sold to the end user on an OEM basis have average to above-average profit potential and high growth rates (in the 30% to 40% compounded annual growth range).

Intelligent terminals and general-purpose programmable terminals also offer high growth rates (35% to 40% per year) and average to above-average profit potential. The very small business computers, such as IBM's System/32, Univac's BC/7 and Burroughs' B80, offer below-average profit potential because of enormous marketing support or "hand-holding" requirements, but the growth rate per year is fairly high (25% to 30% compounded annually).

In contrast, the sale of OEM IC components and microcomputer boards is judged to have very poor profit potential because of the many competitors in the marketplace and the "pricing wars" that have occurred and are likely to continue to occur; however, the unit growth rate per year is still very substantial.

At the other end of the spectrum, large computer systems, such as the IBM 158 and 168 and other competitor models of that class, offer excellent *profit* potential for modest volumes. The foreseeable growth rate per year is expected to remain fairly high. This points up the reason for increased competition from Amdahl, Fujitsu, Itel, etc.

### Software Opportunity

Another major growth opportunity is the software-for-a-price business. This can be broken down into three major categories: industry applications packages, general or cross-industry applications software and systems software.

We estimate that the market for all three categories is growing at close to 50% a year (revenue) through 1980. (For example, IBM's revenues for all program products *and* unbundled services probably accounted for roughly 8% to 10% of the total DP revenue pie, or around $1 billion by year-end 1976.)

With the introduction of such products as IBM's System/34, Honeywell's Level 6, Olivetti's A7 and others, the market for industry applications programs and systems software, as well as supporting services, should now be entering a boom period of at least four years' duration.

### Selective Services Growth

The service bureau business, otherwise known as network information services, should also show impressive growth; however, this growth will be selective. In the next five years we should see a role reversal between the two major network service categories — that is, time-sharing and remote job entry — with the latter emerging to account for over one-half the dollar volume for 1980.

This will be attributable to the increasing importance of the remote job entry-oriented systems, electronic funds transfer systems and POS applications.

The recent introduction and wide acceptance of numerous cost-effective small business systems, minicomputers/microcomputers and intelligent terminals may encourage many corporations to develop their own *in-house* time-sharing or service bureaus with remote distributed small computers or even programmable terminals. If this occurs, as we expect it to, then the traditional service bureau business (as we know it today) may be impacted.

Counterbalancing this trend will be the emergence of significant numbers of small users with little or no in-house software capability. They will require outside assistance in obtaining standard, nonstandard or specialized software for their small systems such as IBM's System/I and System/32, the Burroughs B80 and the Univac BC/7.

Honeywell is (among other things) rapidly customizing its Level 6 to accommodate the newly emerging flood of word processing/management-workstation requirements (product areas which will command our special attention later on in this work). Low-end users will require such customization or tailoring of applications packages and support which, as presently supplied by many of the major vendors, is inadequate.

### Differences Fading

Finally, the differences between the computer services vendors and the equipment vendors are starting to fade. The services vendors are enlarging their scope of operations to provide full ranges of products, including hardware, software and specialized support.

Control Data Corp. offers the most obvious example of the broadening of hardware manufacturers' services. CDC and Xerox Data Systems (which was absorbed into Honeywell's computer operations) were among the first to give up the practice of subsidizing software development costs by hiking hardware prices.

IBM, too, has demonstrated its acceptance of the premise that software is indeed a proper business for a computer manufacturer to be in; in fact, a larger percentage of its revenues will now come from this single source, and in the 1977-1980 period we should expect most of IBM's major supported operating systems (SVS, MVS and VM) and other software which has not as yet been unbundled to be separately priced (see Chapter 11).

The major software growth areas, with an estimated annual revenue compounded growth rate exceeding 25%, include data base management and specialized industry software (which currently accounts for nearly one-half the total dollar volume). Packages in this category include Total, Help (and its derivatives), IMS, CICS, GIS, RACF (data security) and others.

### Fate of Vendors

If the industry as a whole prospers along the lines we project, can all the computer vendors expect to prosper, too (*and* co-exist with IBM)? The answer is obviously no.

There are some who are of the opinion that IBM's worldwide market share is dropping more quickly than might be expected in view of the plethora of minis finding their way into the marketplace and the new vogue of linking these into distributed networks. Were this the case, it might accelerate the demise of some of the other major manufacturers whose pricing policies presume a high IBM umbrella. It should be interesting to see how the Justice Department handles this "Catch-22" situation.

Some of the major manufacturers, such as Burroughs and Univac, have been adding to their installed base at a rate of over 15% per year. Univac reports that over one-half of the 1,000 orders received for its 90/30 system by year-end came from *new* customers, and it expects to increase its state and local government base at an annual rate of 13% through 1980.

The state and local government market is one that is still relatively unexploited; there are others. A well-publicized study from IDC listed 18 key industries, each of which has a DP spending potential of over $200 million per year. The largest of these markets, in the order of their potential growth rates, are hospitals, commercial and savings banks and automotive and other dealers.

### 'Electronic Offices'

No discussion of today's marketplace trends would be complete without at least a few words about the "word-processing" or "electronic office" market. IBM vice-chairman Gil Jones stated at a security analysts' meeting that by 1985 the company's word-processing operations, i.e., its Office Products Division (OPD) and General Systems Division (GSD), would be equal in size to its DP operations today. In other words, by 1985 this business alone should yield $10 billion or so in annual revenue.

IBM's new Word Processor/32 product is a hybrid providing both data processing as well as word-processing capabilities. The characteristics of the new product line indicate that intercompany electronic mail applications are around the corner.

In the U.S. alone, the GSD has more than 2,000 salesmen who will be working with the OPD in focusing on the "office system" or word-processing market. OPD will still have primary responsibility; however, included in the Word Processor/32 product is the new ink jet printer (Model 46/40), an unattended magnetic card-to-printer or hard-copy machine. The ink jet printer produces typewriter-quality pages at a speed of 77- to 92 char./sec, roughly 2.5 times that of equivalent competitive offerings.

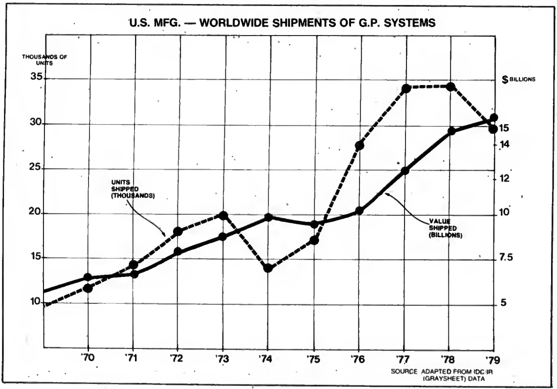
Xerox, Burroughs and Honeywell are also in the so-called word-processing market, but the latter (in collaboration with Base Corp.) is producing a product which goes much further than the IBM word/data processing offering. Cluster systems including electronic mail, electronic file cabinet, indexing and information storage and retrieval are in its plans for 1977.

The true management workstation environment (of which word-processing functionality is but a subset) is indeed just around the corner. Many companies both in and out of the traditional computer industry are serious contenders for a marketplace share in this ever-growing arena.

Finally, terminals (which can be part of office systems) represent another high growth area for the 1980s. Users should require about 4.5 million terminal units by 1980. At present, there are over 1.3 million units installed. This amounts to an annual unit growth rate of approximately 25%.

General-purpose and applications-specialized, programmable or high-IQ (potentially intelligent) terminals will enjoy the highest annual growth rate, in excess of 40%. In terms of the variety and quantity of terminals appearing on the scene, the ensuing years will be tumultuous indeed, and the question of terminal support will become all the more complex as a result. We will discuss this market in detail in a later chapter, when we address emerging trends in communications.

*(Continued on Page 19)*



SOURCE ADAPTED FROM IDC/IR (GRAYSHEET) DATA

Figure III-3

# A Soon-to-Be-Published Book by Charles P. Lecht

*(Continued from Page 18)*

An industry growth-inhibiting factor of the DP marketplace identified by Advanced Computer Techniques Corp. (ACT) in the course of its industry reviews suggests that a major, fundamental roadblock to the use and growth of data processing is the lack or limited availability of data to the end user.

Over 80% of all DP today is believed to be sequential and batch-oriented. Users often maintain many tape files in which essentially inactive and/or redundant data is allowed to remain to no constructive purpose.

Such elementary drawbacks in prevailing systems design concepts must be kept in mind as we seek to focus our energies properly in meeting the needs of the 1980s. The systems of the next decade should not and need not be compromised through the perpetuation of current design insufficiencies, and the question of improved access methods is a prime candidate for our attentions.

Certainly, more processing power will be required and significantly greater CPU "horsepower" will be provided (although a single processor "engine" by 1980 will probably not achieve more than 3 to 4 times the IBM 370/168 level of performance because of the inherent heat and speed-of-light limitations of current high-speed LSI technology). The I/O channels or their equivalent (I/O processors) will also have increased data rates. Main storage will undoubtedly be substantially larger and faster with more functional designs (for example, hierarchical storage structures).

By 1980, "small" machines will be able to offer memory sizes comparable to today's computers, allowing the same job and common operating system to be used across all compatible models from the low-end to the very high-end machines. Furthermore, the old arguments regarding economy of scale ("Grosch's Law"), which currently underlie the tendency to install some applications (primarily scientific types) on centralized large computers; will continue to fade away as the cost of the CPU — and especially of memory — erodes.

### Key Functions to Optimize

The real answer to the question of what to improve is that computer manufacturers should dedicate at least part of the greater processing engine power to providing easier, faster access to data, rather than using it merely as a means to house ever-larger collections of data. Another key function to optimize in systems to be delivered in the early 1980s concerns the *format* of the data whose access we seek to make more efficient.

Data is the most essential element in this kind of system orientation, the "new center of gravity." The so-called arithmetic or central processor units will no longer be "central" — they will he "slaves" (away from the center or on the periphery of the system).

The real growth in DP will not be in the amount of data, although, to be sure, this will grow substantially, but rather in the *usage* of that data. Control over data should be another prime candidate for optimization.

Today, the inability to share, or the inefficiencies involved in sharing, the data base of a given enterprise is the single greatest inhibitor to the usage of that data base. Users can't easily get at the essential data which *already exists.* As a result, they invent their own private copies or subsets of the fundamental data.

Much of the complexity of systems stems from the unavailability of appropriately formatted data when it is wanted. To resolve this major inhibitor to application (and thus to industry) growth, therefore, new, powerful, LSI "process engines" must be explicitly optimized and adapted via microcode to accommodate a need for significantly increased data accessibility.

In our view, this implies a radical adjustment in the way we think about data organization today (but not so big an adjustment to how we thought about it in the 1950s). Rather than designing data files from the perspective of a given application, we may well learn to think "from the bottom up"; that is, to construct a global data base in which all constituent data elements are logically ordered in terms of their names and interrelationships prior to any definition (and thus circumscription) of their use.

Specific applications of great diversity can grow readily from such a source because the limitations that formerly conditioned the organization of the data — the particular exigencies of a unique applications goal — will not be a factor in shaping the data base design concept. The probable differences in perception of the data among variously motivated applications, programmers and end users will not impede their common effective use of the data base that has been constructed in this fashion. Data relationships will be clearer and applications emerge more easily than they do within the limits imposed by our current orientation. (IBM, in its technical disclosures, refers to this new "data" orientation as a "system resource repository and controller," or as "the outboard data manager.")

The actual implementation of this concept (also at times known, at IBM, as "relational data structure") will require a lot of engine power. However, overlapping functions and interdependencies will be sharply curtailed or even eliminated by this approach to the future system, and the true *value* of data will be commensurately enhanced as timing and accessibility, receive their enlarged share of emphasis in the new design concept.

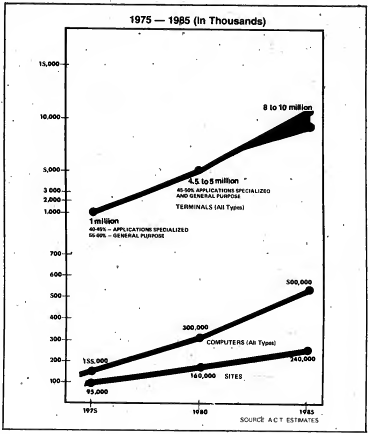
The growth and vitality of the computer industry hinges directly on the commitment we make to this transition. Also, data base machines composed of distributed minis, each controlling a sector of the corporate data base, should forever lay to rest the need for data base conversion through plug-compatible software to central site CPUs.

The changes of which we speak here must be incremental, and the redesign of current applications systems and data formats will be gradual. Old batch mode applications will continue to run without change; indeed, some may never change, as they run on Cobol, Fortran, etc. processors linked to new systems technology — in homes for the aged. Those applications that will change will find their way gradually into the new systems, without impacting current production systems.

Systems do not have to be changed in zero time in order to take advantage of new processing technologies. But eventually the data, the processing and the end-user accessibility that together comprise a "whole" system will be controlled by an intelligent "system resource repository and control box." We wait breathlessly!

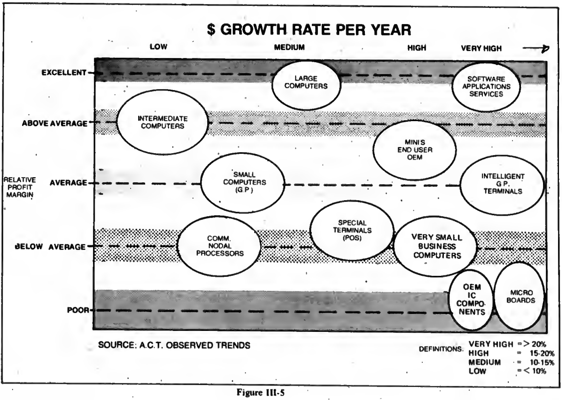
*Lecht is the author of four previous books on computer-related matters:* The Programmer's Fortran II and IV, The Programmer's Algol, The Programmer's PL/I *and* The Management of Computer Programming Projects.

*He is president of Advanced Computer Techniques Corp., which he founded in 1962.*



SOURCE A C T ESTIMATES

Figure III-4



SOURCE: A.C.T. OBSERVED TRENDS

DEFINITIONS.
VERY HIGH => 20%
HIGH = 15-20%
MEDIUM = 10-15%
LOW =< 10%

Figure III-5

# Editorial

## *What's Really Going On?*

The recent hearings held by the Senate Subcommittee on Antitrust and Monopoly [CW, May 9] did little to reassure the public. The only definite point made by the attorneys who appeared was that there are certain deficiencies in the present system — and those "deficiencies" depend on which side one is on.

The most disturbing comment came from Ira Millstein, a New York attorney who stated that "nobody really knows what these cases are about or what they are designed to achieve."

If Millstein is correct, then the application of the antitrust laws should be carefully examined. It is not enough for the Justice Department to bring massive suits against IBM and AT&T to protect the public interest.

If the public cannot identify its interests with these cases, then perhaps the legal goals are not in keeping with what is needed. An antitrust enforcement operation that is understandable only to limited segments of our society has some serious drawbacks. These cases are not being tried as a legal exercise to enrich the coffers of the legal profession and keep the Justice Department staff gainfully employed.

In the IBM and AT&T cases, all the experts expound on protecting the public interest. Each side feels it can correctly interpret what is best for this public interest.

Perhaps nobody understands where the public interest really lies. There is a tendency in democratic bureaucracies for people to become separated from their governments because a needless wall of red tape is created.

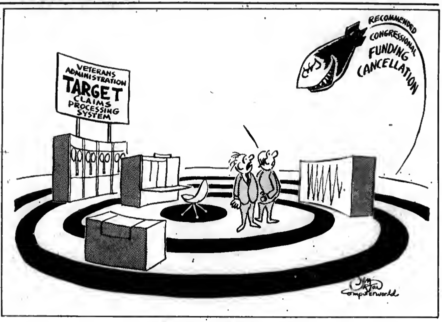
The legal fraternity is even worse because it sets up its own barriers — obscure language — to further confuse the public about what is happening.

It is no wonder the public cannot identify with the potential abuses that would result from a monopoly in computers. And it is not surprising the telephone customer has a hard time relating long-term incremental pricing policies to the cost of his monthly bill.

It may be an appropriate time to rewrite our antitrust laws so they deal with issues that can be easily translated into numbers and facts that anyone can understand. Admittedly, this would be a huge task. But perhaps the economic experts that now produce analyses that serve to further confuse could start using some words and issues that people will accept as more meaningful.

There is too much inbreeding associated with antitrust proceedings that perpetuates the public apathy. Only lawyers and industry experts talking to each other know the jargon. The press can only do so much in interpreting. It is time that these massive cases dealing with what we are told are monumental issues are boiled down to terms that everyone can understand.

U.S. taxpayers are footing the bill for these proceedings. It is high time that somebody takes the trouble to let them know what is really going on.



*'I Think We Picked the Wrong Name . . .'*

# Letters to the Editor

## Monitors Could Help Choose Most Efficient Sort Package

It was with a great deal of surprise that I read "Syncsort or SM-1? Differences Difficult to Evaluate" [CW, April 25]. The author stated he was unable to complete an evaluation of Syncsort, but "if someone demanded an outcome of my study" he would keep both Syncsort and SM-1.

The author also stated Syncsort appears superior when not enough work devices are assigned, when run in a small region, when using too few channels and when using overloaded channels. However, he had to obtain this information from other users.

It is apparent why the author requested his name not be published "for political reasons." Assuming he is a systems programmer or performance analyst, his manager would probably question his ability to benchmark new products of any type.

His article suggested he works for a public utility or government agency where there is an abundance of cash available to purchase multiple packages which perform the same function. Most shops, including my own, would not consider two sort packages or, for that matter, two of any software product which perform the same function.

Maybe if the author purchased one (or maybe two) system monitors, he would be able to determine which sort package performs best under different conditions and, based on this evaluation, choose the most efficient package for his installation.

Charles E. Cappello
System Performance Coordinator
Warnco, Inc.
Bridgeport, Conn.

## Business Program Not Unique

I thought Irving Sherman's article ["University Producing Grads 'Pretrained' in Business DP," CW, May 2] did an excellent job of describing how students should be prepared to enter the field of business DP. However, I wish to point out that he was wrong when he concluded his program was "probably the only one of its kind."

We at the National College of Business have a similar program and have had it since 1968. We offer both a two-year and a four-year program. We stress three broad areas: accounting and business courses; the use of the English language; and programming of business systems.

We had over 200 students last fall and, like Sherman's graduates, our four-year graduates are enjoying close to 100% job placement when they successfully finish the program.

J.D. Wethington
Assistant Chairman, DP Department
National College of Business
Rapid City, S.D.

## Settling the Controversy

On the "disk vs. disc" controversy [CW, April 4 and 25]: Let's forget about the research and the search for truth.

IBM uses "disk"; therefore, "disk" will be the standard. The battle is over.

Donald P. Kenney
Rye, N.Y.

## Poetry Anyone?

I am trying to locate some poetry about computers. If any readers know of any, I would appreciate hearing from them.

D. Van Tassel
Computer Center
University of Calif.
Santa Cruz, Calif.

**Computerworld* welcomes comments from its readers. Letters should be addressed to: Editor, Computerworld, 797 Washington St., Newton, Mass. 02160.**

# Data Past

### Five Years Ago
### May 17, 1972

ST. PAUL, Minn. — A federal court here ordered IBM and Control Data Corp. to be ready for the CDC vs. IBM trial in May 1973. Judge Philip Neville called some of IBM's pretrial information "inadequate" and ordered IBM to "use its best efforts to comply" with CDC.

— — —

CHICAGO — A Microwave Communications, Inc. (MCI) data user had his interstate MCI line disconnected by Illinois and Southwestern Bell without prior notice. The Illinois Telephone Co. said a switch installed by MCI, allowing the user to alternate his Bell modem between MCI's line and a Bell system dial-up line, was a violation of a state tariff.

### Eight Years Ago
### May 21, 1969

PRINCETON, N.J. — In an attack on "free" software, Programmatics called on IBM to "cease and desist" from distributing or maintaining its No. 483 sort package. Programmatics claimed IBM's actions interfered with the marketing of its PI sort.

— — —

DEER PARK, N.Y. — Compudyne, Inc. introduced a monitoring routine to help IBM 360 users determine how much time was spent during either a day's run or on a specific job in using each module or category of system software and each module or program for applications.

## Small Systems People — Part 2

# Mini Vendor Encourages Independent Software Firms

**By Jack Stone**
Special to Computerworld

*Certain minicomputer manufacturing firms, striving to reach the broadest possible market, are sharply cutting costs and corresponding equipment prices, while maintaining or increasing hardware capabilities and reliability.*

*A major target for cost control is the systems engineering force — that indomitable band of DP warriors who must support the sales force at the customer site with those myriad chores necessary for a successful system design and implementation project. And what a host of diverse talents they have historically embraced!*

*In addition to the usual DP tasks of systems and programming, and training and debugging, many systems engineers have played the roles of sociologist, psychologist, marital counselor, travel consultant, and "handholder." — whatever is necessary to get the system in, operating and keep the customer happy.*

*But with the dawn of the small business market, the relatively high costs of talented systems engineers have caused some minicomputer vendors to search for alternatives.*

*Wang Laboratories, Inc., which is rapidly approaching 15,000 minicomputer installations (mostly for small businesses), is evolving a novel corporate strategy whereby the company strongly encourages the development of independent software vendors, who in effect augment their staffs as the independent software firms bring new products and customer support to the small business marketplace.*

*In this column, the second installment of the torrid melodrama describing the interrelationships of four characters in search of power and riches through minisystems, we overhear the soliloquy of Leonard Bornfieth, a senior salesman from Wang's St. Louis office, who is bringing minicomputer happiness to such local small businesses as radio station KCFM, which owns a Wang 2200 and uses Viacomp's radio station management software.*

I've been in DP since before the first commercial computer was built. Most of my career was spent in large-scale systems analysis and design. At this point of my development, I feel that I probably have seen every conceivable business application come past my desk.

I found the big business systems interesting but, during recent years, I have become fascinated with selling and installing what the small business customer demands: ultrareliable, totally human engineered, comprehensive management systems for a typical $35,000 one-time total systems charge.

I am also interested in the field because these small business people are sincerely looking for sales and systems help. They all start at ground zero on the DP ladder and, in most cases, even when they are fully operational, grow to perhaps only one part- or full-time person associated with the DP function. What a contrast with the large organizations!

Maybe I am happy in this business because I can see complex systems designed, programmed, installed and operating in a time scale of weeks, rather than months or years.

The buyer of the small business system is totally preoccupied with getting his business problem solved and is totally disinterested in technology details.

Even for those installations that have been around for two or three years, it is rare to find anyone in the customer organization who has the slightest interest in technology internals, except when the user's job expands beyond the capabilities of the system initially installed. And then the interest is clearly and succinctly expressed as "HELP"!

## The Human Connection

To aid our customers, Wang markets software packages for small business at very reasonable prices. But because of the incredible growth of independent software vendors that support our equipment — there may be several thousand now — the Wang software line is only a small part of what's available for our computers.

Our company has established a policy whereby we locate qualified software vendors that we can recommend to our customers for the purpose of customizing and supporting all software that runs on our equipment.

We even have a certification procedure to qualify a software vendor: Certain criteria of acceptability have been established and detailed forms must be completed by the application who must also pass an interview examination conducted by a Wang manager. The names of certified software vendors are circulated to all of our branch offices and used liberally by our sales force.

A Wang certified independent software vendor brings a valuable set of resources to the minicomputer industry:

- Extensive technical background in applications systems and programming on medium-or large-scale equipment.
- Ability to communicate easily in nontechnical terms to the users and in technical terms to vendors and technical associates.
- Strong dedication to professionalism (which is no different in our business than in any other segment of the industry) to provide the customer with a system to truly meet the needs at a reasonable price.
- Willingness to modify or customize products to meet special requirements (there is no such entity as a turnkey standard business minisystem).
- Staying power to hold the hands of panicky customers for months or even years after installation.

Software vendors typically are very small organizations for good reason. You see, a total systems purchase may range from, say, about $15,000 to about $125,000. Software costs may range from 60% of the total price on the low end to about 35% on the high end.

This costing structure dictates that the software firm operate with negligible overhead and infinite financial reserve since, by current practice, payment in full is rarely made to the software vendor until after the system is up and running and accepted, except for a few last minute changes.

For these vendors to survive, they must bid jobs with consummate marketing skills, control their projects to the penny and ensure that the costs for indefinite follow-on customer support at an unspecified level of manpower are totally reimbursed by the customer.

I feel my future success depends not only on my ability to sell hardware, but my management talents in organizing and coordinating the efforts of qualified independent software vendors and Wang systems people to ensure design integrity, controlled development and proper installation of the mini system.

---

## Two-Level Key for DP Quality

# Software Flexibility Advantageous 'IFF' Not Abused

Dr. Ruth M. Davis of the National Bureau of Standards has been at it again — this time striking out at the danger of program flexibility.

### The Taylor Report

By
Alan Taylor, CDP

She is right, of course, but she is still dealing with a symptom rather than the actual problem involved in getting program quality. There is nothing wrong with having changeable programs, as long as they are not changed improperly.

Program flexibility is — despite anything that Davis says — the great advantage of this computer age. Flexibility is not dangerous, unless it is abused. Abuse of flexibility certainly is dangerous, and this is what Davis should be aiming at, not at the flexibility itself.

One very important concept that leads us into poor thinking is assuming that once an error in a program is located, it can be corrected in its own area without necessary consideration of other items. What this ignores is the interdependence of many program areas where a change in one part can change the operations of another.

I define something as being "correct" (and therefore suitable to be inserted into the system) IFF it is known that all appropriate tests, documentation and approvals have taken place.

### Definition of 'IFF'

The word "IFF" does not appear in most dictionaries. It is an abbreviation, representing either "IF and only iF" in logic or "Identify — Friend or Foe" in wartime usage.

Curiously enough, the two meanings fit very well together. While a friend is anything that has passed through all correct procedures, anything which has not yet qualified as a friend has to be regarded as being a foe of system integrity, i.e. something which would be an abuse of process to include in the system.

IFF, properly considered, not only defines what the procedure is before program flexibility can be used, but also goes on to categorize, as being a "foe" of system integrity, anything which has not been fully tested and approved.

What IFF does not start to do, however, is state what is needed in order to be sure that something is a friend and this lies at the heart of the problem. How can you recognize a friend? This is something the NBS may work on, but presently doesn't appear to have done so.

### Design Work Needed?

Peter and Dorothy Denning, of Perdue University, have been working in the related area of computer security, and some of their con[illegible]ions suggest a different approach. In a nationally distributed wire story last month, Dorothy was quoted as saying computer systems have to be designed with security in view before we will be able to obtain security. When I later spoke with Peter, he explained that Dorothy had been talking particularly about the hardware.

"If I had to choose between an insecure system which would get my work done and a secure system that would be overloaded because of the overhead in performing the security tasks, then obviously I choose the insecure system," Peter said.

The situation of modifying programs seems to parallel the situation of trying to modify hardware to patch in security.

We can all recite some of the reasons why it is impractical to thoroughly test every potential problem involved in modifying a program. And where programs have to interrelate, as they do in data base systems, the testing of programs in isolation, or even whole subsystems in isolation, simply does not fill the bill.

> *'What is wrong at the moment is that we write systems without incorporating facilities for safe modification into the design and production operations. Software flexibility without precaution is what is wrong – not flexibility itself.'*

This is not because of anything that the modification itself may do — but a result of the fact the precise characteristics of the rest of the system is sufficiently unknown or uncertain so the patch can lead to unforeseen results.

Following the Denning security philosophy, in order to permit safe and effective patching of software, a philosophy of software preparation is needed which takes into account the fact there are going to be changes and allows for them in the software design phase.

What is wrong at the moment is that we write systems without incorporating facilities for safe modification into the design and production operations. Software flexibility without precaution is what is wrong — not flexibility itself.

What would a software 'production method which was designed to provide for later modification look like? There is a lot that we don't know — but certain items stand out, such as:

(1) Testing would be included as part of compiling.

(2) Boundary conditions would be tested to error exit routines.

(3) Test results would be stored, and comparisons of test results from generation to generation of the software would be handled as part of the compilation process.

(4) Any test result that indicated a potential problem would be logged and added to the testing library for all future generations.

(5) After the system was apparently in production, a fail-gracefully operation would permit the system to fall back to prior versions of the software, while providing for bypass operations to handle areas known to have errors on the main route. Logs, of course, would be maintained.

With these five conditions met, it would be possible to contain the problems that are implicit in our current use of software. I think it would be wise to improve our automatic programming techniques to incorporate such systems rather than give up the advantage of having software flexibility.

We can do this once we really understand the dangers of software flexibility on our operational systems. All we have to do is understand both meanings of the three-letter word "IFF" and recognize as a foe anything that has not gone through all the procedures necessary to be thought of as a friend.

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# Personality 'Shootouts' All in a DPer's Day's Work?

**By Miles Benson**
Special to Computerworld

## The Sociology of Computing

The clash between Swen Hanson and Bart Richards was probably inevitable.

There was Hanson, manager of Product Development for Softpro, a leading software house.

And there was Richards, Softpro's chief of marketing.

Both men knew their fields from Aardvark to Zip, and both believed in themselves. In spades. If those beliefs ever came in conflict - well, the gunfight at the OK Corral was fought with popguns by comparison.

I was present when the inevitable happened. In fact, you might say I caused it.

The fateful day dawned simply enough. Softpro had a meeting scheduled with a client, Marketronics. We were deep in negotiations for an operating system for the Marketronics 3 PI Computer. My job that day was to present Softpro's tentative design for the interrupt-handling portion of the operating system.

I was pretty confident of the design, and my presentation material was in good shape. Nine viewfoils, a cuff full of additional notes, two or three opening ad libs. And handout copies of the viewfoils.

Because I wanted to check the conference room, make sure everything was in readiness, I was first on the scene. After all, Marketronics had to fly 3,000 miles to meet with us. It was only reasonable to make a last-minute check.

Richards wasn't far behind. The meeting was on his turf, and he wanted to check the facilities over himself.

Then I noticed it. There was no viewfoil projector. I mentioned it to Richards, and it ruffled his feathers a tad. It was up to me to request what I needed to run the meeting, he said. He had loaned out his projector to someone else, he said. He wasn't about to run all over hell to find me one, he said.

Well, I didn't get too upset. Richards was giving me a hard time, but I could handle that. For one thing, I really had screwed up in a minor way, and I figured I might as well take my lumps.

But for another, I had handout copies of the viewfoils. With good backup like that, I could live without the projector.

I told Richards about the backup plan, told him I didn't need the projector if it was a hard problem, and his feathers unruffled back to normal.

Well, just as I felt like Richards was appropriately soothed, and I had calmed down myself, in walked Hanson.

### The Battle Begins

I don't know what was wrong with Swen that morning. He lit into Richards from the words, "Good morning."

"I'm tired of meeting at your facilities," he nearly shouted at Richards, throwing in a few colorful adjectives which I have deleted for the sake of purity. "After this, we're going to meet in my offices."

Well, it was the wrong time to start a war. Richards was carrying a weapon Swen didn't know he had — my booboo.

"Not only will we continue to meet here," Richards said, smug in the knowledge that he had something on Hanson, "but the next time one of your people forgets to make a proper facilities request" (blam - he fired the weapon, and I shrank to the size of a microcomputer) "I'm going to hold you personally responsible."

The explanation of my failure to request the viewfoil projector occupied the next several sentences, liberally sprinkled with profanity at least as colorful as Hanson's. I began to edge toward the furthest corner of the room. It was getting physical. Hanson and Richards were chest to chest, faces puffy and red, words richocheting around the room like rifle shells.

It was over in a moment, but it had been an eternity. Hanson fired his ultimate weapon. "You can keep your colorful meeting room and your colorful viewfoil projector," he shouted at top lung. "Just see how much colorful good you can do at this meeting without my support."

And with that, he turned to me, cowering in the corner, and ordered, "C'mon, we're pulling out of this meeting." Then he strode out.

Things were still happening fast. A stunned look crossed Richards face for a moment and, just as quickly, his jaw clenched with resolution and he, too, strode out.

And there I was, alone again in the room, echoes still bouncing off the walls, the silence stunning for its suddenness. It was just me and that battle-scarred conference room. And my dilemma.

I had been given a direct order. By a manager three levels up. And common sense cried out that I had to ignore it.

Well, what would you have done? Remember, Marketronics folk, innocent of our in-house clash, were minutes away from arriving after a cross-country trip. Washing our dirty linen in public would be an understatement for what would result if we canceled the meeting. Besides, I was *ready*. But could I ignore a direct order? After all, peons only have so much power.

As I stood there with my coding pencil figuratively stuck in my ear, mulling it all over, the fourth person to arrive at the meeting hove into view. And, fortunately for me, it was Len Johnson, Hanson's second-in-command and a technical strongman in his own right. Quickly I filled him in. Time was of the essence.

Johnson sized it all up quickly. He immediately headed for the office of Simon Percival, Softpro vice-president for technology and Hanson's boss, with me tagging along behind. Percival, too, sized it up, and acted.

"Support the meeting," he said. And Hanson's heat-of-the-moment order was countermanded.

Just in time.

The Marketronics contingent was in the conference room when we got back. And so was Bart Richards.

"Good morning, gentlemen," Len Johnson said, entering the room and shaking hands all around. "I'm afraid Swen Hanson can't be with us this morning, and I'm sitting in for him." A look of puzzlement flashed over Richards face, and was gone just as quickly. "Let's begin," concluded Johnson.

As I stood up to begin my presentation, my knees nearly buckled and my hand shook beyond belief. But it only lasted for a few minutes. Before long, I had immersed myself and my audience in the wonders of enabling and stacking and servicing interrupts.

Besides, what was there to be shook up about? Isn't the gunfight at the OK Corral all in a software man's day's work?

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## Reader Commentary

### *Should Be High in Organization*

# Survey Finds Users Best Served With Interface Unit

**By Kenneth J. Crepas
And Frank Muire**
Special to Computerworld

There is a communication, control and planning problem which exists between the DP department and the end user. In order to determine how other companies deal with this problem, a survey was sent out to 60 companies located throughout the U.S.

The purpose of the questionnaire was to obtain subjective responses to general questions involving the subject of user interfaces and how the companies handled the problems of communication, control and planning with the user. In addition, those surveyed were asked whether they had a user interface unit.

Since the questions are subjective in nature and no rating scales were used, we will attempt to interpret the answers into meaningful results.

The questions used in the survey were as follows:

1. Who are your end users? (State functions such as accounting, personnel, administrative services, etc.)
2. What type of services do you provide the user?
3. How do you ensure quality of service to the user?
4. How do you bridge the communications gap between the user and the DP department?
5. How is planning between the user and DP handled?
6. How do you handle problems between the user and DP?
7. Does your organization have a User Interface Unit?
8. If yes to No. 7, what are its functions and objectives?
9. If yes to No. 7, what type of personnel and their qualifications are in this unit?
10. If yes to No. 7, where in the organization is this unit located and to whom does it report?

There are three hypotheses we tried to prove with this survey. They are:

- That the problems of communication, control and planning between DP and the user are hest handled through a User Interface Unit.
- That the type of personnel and their qualifications with the User Interface Unit must be of the highest caliber and have the ability to interface with the user community.
- That the location of the User Interface Unit in the organizational structure should be relatively high in order to provide the best quality and service to the user community.

### Response of 35%

The questionnaire consisting of 10 questions was mailed to 60 participants, of which 21 responded for a response percentage of 35%. The quality and geographical cross-section of the participants made this survey very helpful.

In response to the first question — "Who are your end users?" — a wide variety of answers were provided. The only valid conclusion that can be drawn from the responses is that there is a wide variety of users for whom the DP department provides services.

To the second question — "What types of services do you provide the user?" — responses again varied and the only conclusion is that DP performs many services for its many different users.

Based on the responses received to question No. 3, the majority (52%) of those companies responding feel the function of ensuring quality of service to the user belongs in a User Interface Unit. In responding to question No. 4, 76% of the companies agreed the User Interface Unit should be the area responsible to help bridge the communications gap betwen the user and DP.

In question No. 5, as with the previous two questions, the majority of responding companies (57%) feel the function of planning between the user and DP should be handled by the User Interface Unit. Likewise, in question No. 6, 66% of the companies indicated a preference for having the function of problem resolution handled by the User Interface Unit.

To question No. 7 — "Does your organization have a User Interface Unit?" — there were 15 "yes" answers and five "no" answers' one respondent answered, "yes" but stated "Steering Committee."

Therefore, it appears as though 76% of the companies responding have a User Interface function within their DP organization.

To question No. 8 — "What are its functions and objectives?" — responses were almost identical to responses obtained from questions 3 through 6 and the same comparisons can be made. Based on the responses to question No. 8, it would seem that the primary objectives and functions of a User Interface Unit should be communications, problem management, planning and control.

It should be mentioned that the next three answers are also functions that could easily be handled by the User Interface Unit, i.e. procedural development, scheduling and consulting. Question No. 9 — "What type of personnel and qualifications are in this unit?" — provided some very interesting results. Again, we had to interpret and group many of the responses into meaningful categories, so the results are not in the exact terms of the respondents. However, the majority of respondents believed that experience, communications ability and highest level employees were the most important factors.

The final question — "Where in the organization is this unit located and to whom do they report?" — was also categorized and compared with how many levels below the DP manager this unit is in the organizational structure. It is interesting to note that 94% of the responses indicated the User Interface Unit should be at least two levels from the DP manager.

It would seem that the User Interface Unit belongs in either data control or operations, since 75% of the responses indicated this choice.

In analyzing the overall results of the survey to the three hypotheses, we accepted all three hypotheses as being valid. The first hypothesis is valid because the response percentage of 62% of the companies indicated they handled the problems of communications, control and planning with a User Interface Unit.

The second hypothesis is valid because the responses to question No. 8 showed the respondents rated experience, communications ability and highest level employees as the most frequent responses to type of personnel and their qualifications.

We contend these terms clearly indicate that the type of personnel and their qualifications in the User Interface Unit must be of the highest caliber and have the ability to interface with the user.

The third hypothesis is valid hecause, of the 16 respondents, 15 stated that their User Interface Unit was located at least within two levels of the DP manager in the organizational structure. Based on the survey results, then, the User Interface Unit should be located relatively high in the organization structure in order to provide the desired quality and service to the user community.

*Crepas is associate professar of finance at Illinois State University in Normal: Muire is a superintendent af DP Services far State Farm Auto Insurance in Bloomington, Ill.*

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## Reader Commentary

# Program Aims to Fix Failure of Julian Date Formulas

By Stuart R. Sheedy

Special to Computerworld

Many of the "Julian date" formulas that one sees are based on the fact the mean length of the year, in the Gregorian calendar, is 365.2425 days.

Any such formula will come out exactly right at the end of a 400-year period, but will very likely be wrong, by one day, for about half of the years in between.

The reason for this is that the intercalary days, the Feb. 29s, are not inserted regularly in the calendar as they accrue under the formula, hut according to the slightly more whimsical method instituted by Julius Caesar and modified by Pope Gregory XIII.

Nevertheless, with a little pencil chewing, it is possible to construct a simple program that handles leap years correctly, derives a unique data number (cumulative days to date) and also elicits the day of the week.

For simplicity's sake, this program will be written in Pig Basic. First we will lay the groundwork by introducing the names of the months and days:

```
LET M$ = "JANFEBMARAPRMAYJUN-
     JULAUGSEPOCTNOVDEC"
LET W$ = "MONTUEWEDTHUFRISATSUN"
```

I know that Sunday is the first day of the week, please don't interrupt. We will also want a 12-month's worth of "elapsed days up to the first of the month":

```
LET MO$ =
"000031059090120151181212243273304334"
```

Then we need an algorithm for cumulative days under the Gregorian calendar:

```
DEF FNA(Y,D) =
INT(24.25*INT(Y/100))+INT(25*FPT(Y/100))
+385*Y+D
```

And because we want to be able to go back to the very beginning, we need the same thing for the Julian calendar:

```
DEF FNB(Y,D) =
25*INT(Y/100)+INT(25*FPT(Y/100))+
365*Y+D-2
```

Now we are ready to input any eight-digit date in the form MMDDYYYY. The first two digits, the month, we will call N1; the next two, the day, will be N2; then we will LET N3 = 3*N1-2 because it is convenient to do so; and the year will be N4.

The name of the month will be found in M$ at (N3,3), and the number of days from Jan. 1 through the end of the previous month will be NUM(MO$(N3,3)). To this quantity, we add N2 and call the result N5, the day of the year.

At this point we need to know whether we are dealing with a leap year or not, and this depends on whether the date is before or after the change in calendars. We must digress.

### Gregorian Calendar Debut

The Gregorian calendar first went into use in Rome and in Spain and Portugal when Thursday, Oct. 4, 1582, was immediately followed by Friday, Oct. 15. The change was made in December 1582 in France, in 1583 in the Catholic states of Germany, in 1700 in the Protestant states of Germany.

However, it was not in use until 1752 in England and the American colonies, when Wednesday, Sept. 2, 1752, was followed by Thursday, Sept. 14.

Ten days were dropped in 1582, but the English had to drop 11 days; the reason being that while 1600 was a leap year in both calendars, 1700 was a common year in the new calendar.

Anyway, in the English-speaking world:

```
IF N4 <1752 OR (N4=1752 AND
NUM (mmdd) <0914) GOTO (Julian)
     ELSE (Gregorian)
```

The Gregorian leap-year formula is:

```
IF FPT (N4/4)= AND
FPT(N4/100 <>0) OR FPT(N4/400)=0
AND N1 >2 LET N5=N5+1
```

and with this information we can now get the cumulative days to date with the function that was defined above:

```
LET N8 = FNA(N4-1,N5)
```

The Julian formula is simpler:

```
IF FPT(N4/4)=0 AND N1 >2 LET N5=N5+1
and LET N6 = FNB(N4-1,N5)
```

In either case, N6 represents a continuous and consecutive running total of elapsed days since the beginning of the present era. Unfortunately, it is necessary to cheat just the least bit.

From Jan. 1, Year 1, Old Style, to Oct. 4, 1582, there were exactly 577,737 days: 1581*365 = 577,065 + 395 leap-year days + 273 days through Sept. 30 + 4 days in October.

But if we extrapolate the Gregorian calendar back to its Jan. 1, Year 1, there are only 577,736 days to Oct. 15, 1582: 577,065 + 383 leap years + 273 + 15.

That is the reason for the "-2" at the end of the Julian function, which several of you at the back of the room were raising your hands about when it was introduced.

By subtracting 2 from any Julian calendar day-number, we get a continuous series of consecutive numbers that are in agreement with the calendar we use today; the price we pay is just that the historical Jan. 1, Year 1, becomes Day No. -2.

### Discrepancy Explained

Another digression: The reason for the two-day discrepancy is that Gregory intended to move the vernal equinox (and Easter) back to the position in the calendar that they occupied, not in the Year 1, but at the time of the Council of Nicaea in the Year 325.

The years 400, 800 and 1200 would have been leap years anyway, but the 12 other centennial years that were leap years in the old calendar would have been common years in the new. Only 10 of these days were dropped by Gregory, leaving us with a two-day fudge constant.

### Benchmarks Handy

Anyone experimenting with date formulas will find it handy to have a few benchmarks. The earliest that I have been able to come up with is Mohammed's flight from Mecca to Medina, which took place in the lunar month that began on Thursday, July 15, 622 A.D.

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## Random Notes

### 'Capturing Requirements' Topic of Toellner Course

LOS ANGELES — A two-day training course on "Capturing User Requirements" — originally offered only to installations installing the Spectrum-I methodology from J. Toellner & Associates — is now available to all firms, according to a Toellner spokesman.

The course stresses the communication process between users and analysts. In the two-day workshop, attendees develop skills equivalent to having captured a complete set of requirements of an on-line project, he claimed.

The training is held on the client's premises for a group of up to 16 analysts and costs $2,000 plus the travel expenses of the Toellner instructor.

All handouts and other materials are provided, the company added from 4311 Wilshire Blvd., Los Angeles, Calif. 90010.

### Measurement Group Sets Meeting for This Week

ATLANTA — The quarterly conference of the Southern Computer Measurement Group, scheduled for later this week, is open to any people interested in improving the performance of their installations, according to conference chairman Ed Abrasley of the Trust Co. of Georgia.

The meeting will be held this Thursday and Friday, May 19 and 20, at the Riviera Hyatt House here.

There is a $10 registration fee for the meeting. Other details are available from Ahrasley through P.O. Box 4418, Atlanta or by phone at (404) 588-7743.

### 'CMPRES' Cuts File Space 25%

DALLAS — Users with IBM 360/370 equipment can reduce the length of their alphanumeric files by 25% with the CMPRES/EXPAND subroutines from Computer Action, Inc., according to the vendor.

That saving applies whether the files are fixed- or variable-length records, a spokesman explained, because the compression technique converts every 8-bit byte into a 6-bit pattern.

Compressed records can be sorted, he added, because the collating sequence of the compressed sort keys is preserved.

The subroutines can be used with programs written in any language that has a CALL facility. The CMPRES routine requires 636 bytes of memory; EXPAND takes 512.

Assembler language source decks for each are available for $250, Computer Action said from Suite 560, 6060 N. Central Expressway, Dallas, Texas 75206.

### *When Its Cost-Cutting Time . . .*

# Manager Should Check Software First

**By Frank Vaughan**
Of the CW Staff

CHICAGO — Squeezing more from the software budget might be the solution for any belt-tightening DP manager currently facing budget cuts, according to a speaker at the recent Computer Caravan here.

"What would you do if you walked into your shop tomorrow and were told by senior management to reduce your overall operating expenses by 40%?" Martin A. Morris Jr., a unit manager with the Systems Management Division of the First National Bank of Chicago, asked in setting the stage for his presentation.

There are four general areas the DP manager can look to when faced with the need to cut expenses: personnel, software, systems utilization and documentation and maintenance aids. Perhaps the best of these alternatives is in the software area, Morris said.

"I feel fairly confident very little new or creative work is ever accomplished in applications or systems software today," Morris contended.

Must the manager faced with a user request to develop a new system be committed to developing that system in-house? he queried. A purchased package could do the same job, he noted, adding the possibility that a service bureau could do the job cheaper and more efficiently must also be considered.

"Most of us do basically the same things in developing systems. The problem lies in the fact that we have no system for what we do. We each go merrily along through systems design, designing (or more correctly, redesigning) our unique wheels without the slightest genuine concern for whether someone else has already built the same thing," he said.

"All of our wheels will eventually roll, but usually at a prohibitive developmental and operational cost. The amazing thing is that our wheels will probably only differ in the fact that yours has a red spoke, mine has a blue spoke and the guy down the street has a green spoke with an airhorn mounted on the side," he remarked.

If a manager has any influence at all on budgetary decisions within his firm, he owes it to the stockholders to investigate all of the possibilities for new software, he claimed.

Most managers look to the personnel area when it is time to make budget cuts. This isn't always the most advisable alternative, Morris noted; most DP installations have long since reduced their rosters and the average DP shop just doesn't have much fat to trim.

"The secret might just be in training and educating your personnel in what your business is all about. Don't, by design, make them 'computer experts,'" he warned. Instead, personnel should be trained to understand and solve customer problems and to consider the computer as only one of the tools available to complete that job, he suggested.

"When was the last time you measured your systems performance?" he continued.

"If you are using a data base management system like IMS, when was the last time you used its internal monitors to determine how efficient your Path calls are?

"When was the last time you checked the relative placement of your data sets with DSORG? After you got the report, did you do anything with it?" he challenged his audience.

Managers should also consider using a hardware monitor to determine if they have a proper channel mix, he said.

"Are you still maintaining your source programs on cards? If so, have you investigated the costs and liabilities of keeping those cards around?" he asked.

Source program managers such as Librarian (from Applied Data Research) and Panvalet (from Pansophic Systems) could provide adequate backup, he noted.

"Believe me, anything is better than having to try and resequence a dropped deck of cards," he said.

Much interest is currently focused on data dictionaries, Morris pointed out. Managers who have had to modify a data base and add or remove data elements from a segment can appreciate the value of having a centralized means of identifying which programs had to be modified extensively and which required only a recompilation to pick up the required structure, he said.

# 'IAM' Cuts System Resource Use And Outperforms IBM's Isam

CLIFTON, N.J. — The Innovation Access Method (IAM) was described by its developer, Innovation Data Processing, as a functional replacement for IBM's Isam and Vsam file-processing routines. Designed to coexist in the operating system with them, IAM "significantly outperforms" each of those access methods, Innovation claimed.

IAM provides random and sequential processing of both fixed- and variable-length records. The independent software is said to give users of OS, VS1 and VS2 (both SVS and MVS) systems a means of reducing runtime and system resource requirements.

Available for use in batch or on-line applications, IAM can reduce disk I/O time 50% or more, the company claimed. This savings is made possible by a seek approach which passes through fewer indexes, a spokesman said.

The Innovation system can improve throughput 50% or more compared with Isam or Vsam, yet cut an average 30% off an application's CPU time in the process, the company claimed. IAM files also require 10% to 30% less disk space, according to the spokesman.

IAM is operating system-independent. No Sysgen is required, nor are any modifications to the operating system. IAM files can be placed on any device supported by IBM's Bdam in an OS or OS/VS environment, the vendor said.

The package is available under a one-year lease for $10,000; renewals are at gradually increasing discounts, Innovation said from 970 Clifton Ave., Clifton, N.J. 07013.

# HIS Runs Program Clearinghouse

NEWTON HIGHLANDS, Mass. — The Automated Reference Index (ARI) is a marketing program instituted by Honeywell Information Systems, Inc. to help members of the DP community capitalize on the rising demand for software products. It gives both developers and users an inexpensive opportunity to see what is available, an HIS spokesman explained.

The ARI program consists of five steps. Software developed by HIS customers, by IBM 3 users or by any other developers working in any of the common programming languages can be listed free by ARI.

These products are advertised to HIS customers and prospects through a soft-cover catalog, now more than 150 pages long and updated three times a year, and through a data base that is on-line to all HIS branch offices.

Inquiries about specific products received by HIS representatives are referred to the products' suppliers; after that, negotiations are conducted between supplier and user.

Once a product is sold, the seller is obligated to HIS for a finder's fee, currently 10% of the selling price. Submission of this fee to ARI is, in effect, on the honor system since HIS has no formal part in the negotiations, the spokesman noted.

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## *Extras Called Important*

# File Analysis Leads User to Choice of Sort Package

**By Don Leavitt**
Of the CW Staff

NEW ORLEANS — Sorting is always a significant and often critical part of a business-oriented DP center's workload, and users are beginning to realize they have some choice in sort packages.

An insurance company here with a 512K IBM 360/50 and two dozen 2314 disk spindles running under OS/MFT recognized its options about a year ago and broke away from the IBM-supplied sort it had been using.

Pan American Life had been running with IBM's SM-I sort "for quite a while," according to systems analyst Tony Pittari, but some very large sorts required for the Medicare work the company performs were proving too much for the small disks to handle.

"We were abending and rerunning more sorts than we were completing," Pittari said recently. Because of its contractual arrangements with IBM, however, Pan American's management required a full cost justification before it would approve any switch.

In February 1976 the DPers brought in Syncsort from Whitlow Computer Systems and CA Sort from Standard Data (now Computer Associates).

### Detailed Evaluation

"Our management wanted a thorough investigation, so we listed every feature in all three utilities," Pittari explained. This listing included not only a comparison of technical capabilities, but a range of other things as well. Costs were noted as was the quality of documentation, especially its readability, the analyst said.

Utilities asociated with each package and the flexibility of the control card options were listed. "In fact, we showed everything we could think of — the whole gamut," he added.

But documenting features was only part of the evaluation; test runs were equally important.

In a stand-alone, dedicated environment, Syncsort outperformed its competitors, but Pittari noted that CA Sort "is a good product, with lots of flexibility and some features that Syncsort didn't have, at least then."

### Selection Reasons

In June Pan American selected Syncsort and Pittari pointed out several reasons for the choice.

He was, for example, impressed with a file analysis subsystem that generates a histogram showing the number of records in each file and the number of bytes in each record.

This is especially useful with variable length records since it allows the users to pass accurate parameters to the sort. In turn, the sort is better able to calculate good core size and other work space in order to get through the sort process more efficiently, Pittari said.

That sizing is used on the bigger sort operations and is certainly a help, he continued, but Syncsort's dynamic allocation of disk space is the feature that has overcome almost all the Abends which had been caused by lack of disk space.

There's support for smaller sorts as well, he said. Syncsort has the ability to sense when it can perform a turnaround or in-core sort. When the sort logic can do that, it uses no I/O and relieves the entire system of a load on its channels, he said.

Pittari indicated he is also aware that many of his processing problems go back to the use of 2314s. "We know they're not the best, but they are what we have so we want to get the most we can out of them until we upgrade the whole system."

*(Continued on Page 28)*

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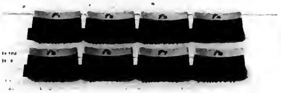

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# T/S Service Helps Engineers Dig Into New Concept

TORONTO — A new concept in tunnel construction that saves a third or more of the cost of former techniques has been pioneered by a Toronto consulting, engineering and planning firm, with help from a time-sharing network.

Developed by R.V. Anderson Associates Ltd., the system involves precast concrete thin wall sections interacting with soft soil without steel reinforcing. It means tunnel work can be completed in about half the time previously required, according to professional engineer Douglas D. Dunbar.

But the new system was not an overnight revelation. It took years of study of tunneling techniques around the world and development in precast concrete concepts and new types of tunneling machines. It meant entirely new thinking, Dunbar said.

### Eliminates Wood Bracing, Steel

"There was a lot of resistance to this concept," Dunbar recalled. "There are a variety of successful techniques for tunneling. We had a concept that eliminated all the wood bracing and all the steel.

"People were understandably afraid of this concept. I was a little afraid of it myself," he added.

It was only when Dunbar found a way to analyze the concept that the idea became a reality. The 11,000-foot, 85-in.-diameter Neebing-McIntyre sanitary trunk sewer in Thunder Bay, Ontario, is proof it works.

"I had tried everything possible to analyze the design," Dunbar explained. "I tried a variety of computer approaches. We had been using time-sharing systems for a number of years. I knew intuitively it would work, but without positive proof we simply could not recommend it.

"The computer analysis that finally gave me the proof was a program called MRI/Stardyne, which was available through Cybernet Services of Control Data Canada.

"Stardyne meant that for the first time we could have the structural model divided into an infinite number of parts and all stress considered. For the first study, we contracted with Control Data for its Professional Services Division to do the analysis with us.

"The company had the people who were both engineers and computer experts and we learned from them as the concept went through complete analysis. It had to be studied in relation to various thicknesses of precast concrete and for different soil conditions.

"Between Control Data's people and ours, we proved the new approach would work," Dunbar said:

### Selecting Pilot Project

Even when the concept had been proved, however, it was a matter of putting together the right project for using the system on a pilot basis — the contractor, the tunneling equipment required and the company to manufacture the precast sections.

The right project was the Neebing-McIntyre sewer where a deeper than usual, soft-soil tunneling technique was required.

Mole Construction Co. of Cleveland, Ohio was willing to bid for the contract on the basis of the new technique. The special tunneling machine, with an arm behind to lift the 1,000-pound precast tunnel segments into position, was made by Lovat Tunnel Equipment, Inc, of Toronto. The precast segments were manufactured by Pre-Con Co. Ltd. in Brampton, Ont.

By the time the first 4,000 feet of the technique tunnel were finished, the contractor found it was at least 30% faster. The computer analysis had proved it would work and it did.

Since then, R.V. Anderson Associates has used MRI/Stardyne not only to prove its new concepts, but to improve on many of the classic tunneling techniques.

In Winnipeg, for example, the firm was called in to check some tunnel designs and to solve a problem where a contractor had gone off-line in grade. In these cases, MRI/Stardyne was used to analyze the possible solutions and it proved itself again in terms of cost savings.

# Custom Work Offered For SMF Record Study

KANSAS CITY, Mo. — Joseph M. Joyce & Associates will create custom programs for any SMF records generated under OS or OS/VS.

The work will be done within 10 days and costs $200 to $1,000, the company said from 5925 Rockhill Road, Kansas City, Mo. 64110.

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## APL Drives Table Processor

WHITE PLAINS, N.Y. — The APL Decision Table Processor (DTABL) package now available from IBM is a set of APL programs that can help the user construct and maintain a library of limited entry decision tables which can be compiled into high-quality procedural code, the vendor said.

With DTABL, decision tables can be validated for consistency and completeness.

Although DTABL is written in APL, a knowledge of that language is not required to use the package's facilities. Output from the system is source code in Algol, APL, Cobol or PL/I — depending on which version of the processor is acquired, a spokesman stressed.

Flow chart representations of programs adequately emphasize major activities and overall logic flow, but a given logic can be specified by many different flowcharts or programs, he noted.

The DTABL compiler, in effect, attempts to select the best or near-best flowchart or program and enhances user productivity by removing flowchart selection details as a concern.

Questionnaire processing is available as part of DTABL. When a decision table is treated like a questionnaire, the user is interactively guided through a series of "yes/no" questions (which set the conditions) to the proper set of directions (actions), he continued.

This Installed User Program (IUP) is designed to operate with IBM's APL Shared Variables, version 2.1 or 3; with the VS APL processor or with APL/-CMS; under OS/VS1, OS/VS2, Virtual Storage Personal Computing (VSPC) or Virtual Machine facility (VM/370).

APL Decision Table Processor is available now at a monthly license fee of $500 which is waived after the first 12 consecutive monthly payments.

## File Handling, Application Code Improved Under 'Foresight 5.5'

CENTURY CITY, Calif. — Foresight, described as an application language for financial and management purposes, has been enhanced by the developer, Foresight Systems, Inc.

Foresight 5.5 is said to include both file handling and application-related changes.

Foresight is based on an English-language command structure which is nonprocedural so that it can be used by non-DP-oriented clerks and managers, according to a spokesman.

The system has been used to develop budgets, merger and acquisition analyses, real estate feasibility studies and corporate financial models, he added.

Release 5.5 permits two levels of internal file security with the system's access protection feature. The update also supports enhanced external file handling commands in its Datain, Dataout and Input Disk routines, the company said.

In addition, an EXIT command has been implemented allowing users to include their own subroutines directly in a Foresight model, the spokesman noted.

### Routines Enhanced

The financial routines have been upgraded and enhanced, he added, to include continuous discounting under the DISCOUNT, RATE OF RETURN and PRESENT VALUE commands. The AMORTIZE command has also been enhanced, the company said.

In addition, the DEPRECIATE command now allows the user to compute 100% declining balance, modified half-year depreciations and optional crossovers from declining balance to sum-of-year digit methods. The statistical Foresight routines have been upgraded with multivariate and polynomial regression, the spokesman said.

A scatter plot feature allows the user to generate line and bar graphs on any terminal or printer as well as continuous plotting on units equipped for that output.

The capabilities of Foresight 5.5 are available as a package for use on in-house IBM 360/370 gear or as a service of the United Computing Services network, based in Kansas City, Mo.

Foresight Systems, Inc. is at Suite 585, 1901 Avenue of the Stars, Century City, Calif. 90067.

## Fortran-80 Handles Most ANS Data Types

ALBUQUERQUE, N.M. — Fortran-80, a Fortran compiler for the Intel Corp. 8080-type microcomputer, is a full implementation of the American National Standard (ANS) specification "with the exception of the double precision and complex data types," according to the developer, Microsoft.

The package provides three data types including "logical" (1 byte), "integer" (2 bytes) and "real" (4-byte floating point). The missing data types will be included in a forthcoming update, the company claimed.

The one-pass compiler in Fortran-80 generates "pure, relocatable code" and requires less than 12K bytes of memory, according to a spokesman. Both the compiler and the run-time system (which requires less than 6K) may be placed in read-only memory, Microsoft noted.

A relocating linking loader is included in the Fortran package. Therefore, subprograms may be compiled separately and linked at load times.

Another part of the package, the company said, is a relocating assembler and an Assembly language debugging program. The assembler can be used to create Fortran-compatible subprograms; the debugging system can be used with the load map produced by the loader to debug either Fortran or Assembly programs.

Individual copies of Fortran-80 can be purchased for $500, including documentation. Extra manuals cost $15 each, he said from 819 Two Park Central Tower, Albuquerque, N.M. 87108.

**Cullinane acquires Computer Audit Systems, Inc.**

**As a result the Cullinane Corporation now offers complete EDP audit software for IBM and non-IBM computer users.**

The acquisition of Computer Audit Systems, Inc., provides Cullinane with CARS 3, the well-known and highly respected audit package.

CARS 3, plus Cullinane's EDP-AUDITOR/CULPRIT System, provide a truly powerful capability for auditing IBM and non-IBM computers, including Burroughs, Honeywell, NCR, Univac, and ICL. This is particularly important for audit firms, holding companies, conglomerates, regulatory agencies and other organizations that must audit a variety of computers.

Computer Audit Systems, Inc., which is located at 80 Main St., West Orange, N. J., will operate as a wholly owned subsidiary of Cullinane, and Richard A. Hirschfield will continue as President. Mr. Hirschfield will also take a lead position in the introduction of the Cullinane Corporation's new Integrated Data Dictionary. In addition, these offices will serve as the Northeast support location for the other Cullinane products, including the IDMS Database Management System, On-Line Query, and the SHADOW II TP Monitor.

With the addition of the CARS users, the Cullinane customer base is now approaching 1,000 users.

For complete information on Cullinane audit or database related software, write Cullinane Corporation, 20 William St., Wellesley, Mass. 02181. Or phone: 617-237-6600.

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## Data Basics

# Planning Enables College to Graduate to DBMS Use

**By E. Timothy Lightfield**
Special to Computerworld

TRENTON, N.J. — A key resource for the effective management of colleges (as of other organizations) is information — not only operational or transactional data, but also management information as the basis for control and planning.

The primary characteristic of management information is that it is dynamic. This information will change as management and the business climate change.

With the leveling of enrollments and the resulting leveling of available dollars, management emphasis is currently on more effective control of fixed or even retrenched resources. Information regarding the interactions among resources is now necessary to evaluate the impact of alternatives before a decision is made.

We in college administration simply must have optimal access to data for operations, control and management.

### Communication Gap

While the need for such information is apparent, in the majority of cases the investments in computing power have not fulfilled the needs. A major reason for this has been the communication gap between the expectations of users and college management and the emphasis of our DP experts.

Colleges have not taken the same time and effort to manage their information resources as they have their fiscal, facilities, program, personnel and student resources. The DP people have concentrated on the efficient operation of their ever-changing computer technology.

With neither side giving direction on how to apply the technology to college needs, management frustration over the lack of results has increased proportionately to the increased investment in the computing facility.

Without clear planning and direction, the DP staff here at Mercer County Community College (MCCC) responded individually to departments and offices as they sought help. The staff treated each system as a separate and unique entity. This resulted in data files being defined by a programmer whose primary concern was efficient system operation.

The approach met the intended need, but became a frustrating problem when anyone wanted to combine data from two different systems. Such basic requests became major programming efforts when data files were not compatible.

In what became the rule more than the exception, special mapping routines had to be designed to provide the merged data from the department structures. Once written, such mapping routines had to be maintained as changes were made in the department structures of the system.

For this reason the college became involved in an extensive implementation of administrative systems under a data base environment through the use of software and organizational changes.

Since its founding in 1966, MCCC has had an information system, primarily utilizing an IBM 360/40, but that utility increasingly has fallen short in the operations of the college.

Our administrative DP was developed piecemeal. As additional requirements were added, the original application program was expanded or revised to meet the information needs of new users and applications.

Data was passed from one user to the next with many of the files propagating errors and users tending to build their own files and ignore the system.

Our problem, then, was to come up with some mechanisms by which we could manage our data and turn our assortment of systems into one common and collegewide information pool.

### Central Repository

A decision was made to establish a centralized repository of data. This led us to an evaluation of available data base management systems (DBMS) including Software AG's Adabas, IBM's Vandl, Cincom Systems, Inc.'s Total and Cullinane Corp.'s IDMS.

We chose Total because of its relatively low core requirements, its ease of use and implementation, its flexibility, its high performance level and the vendor's backing and support.

At the same time, we created the position of data base administrator (DBA) distinct from the computer center. The DBA, in fact, reports directly to our dean of planning and information services.

### Glaring Need

By purchasing a DBMS, the need for planning was glaringly and undeniably evident, particularly to those on the college staff who were satisfied with the information they were receiving without appreciating the actual problems that existed in the system. By purchasing Total, we acquired a planning architecture which we could adapt to our own purposes and characteristics.

Having the requisite hardware and software and accepting the data base concept may be considered the keys to an effective administrative computer support system. If only technological aspects of the data base concept are considered, however, the DBMS may be sound without being responsive to the operational, control and planning needs of the college.

The complete solution, then, must be effective planning of a systems development effort to meet users' needs. MCCC, with continuing assistance from Cincom, is now undertaking an extensive information system planning project to identify and satisfy the immediate needs of the organization and to provide maximum flexibility to change as requirements change.

The initial scope of the project is to develop a comprehensive documentation of all information activities performed within the college and the elements of data produced or used. Following this documentation of activities and associated data requirements, the planning project will formalize event description and the dependence of events.

The composite scheme of logical events and relationships will become the formulation for the physical data base architecture and systems engineering in which questions of implementation considerations and priorities are addressed.

This approach to the development of an information system reflects a willingness and desire within DP (and college management in general) to invest more in the planning and design processes. Our approach is grounded in the acceptance of a shared responsibility of all participants for information as a collegewide resource.

A more enlightened and verified comprehensive design exercise, while delaying the implementation of the DBMS, should result in end products which are more reliable, more usable, more effective, more maintainable and more trustworthy.

*Lightfield is dean of planning, management and information services of Mercer County Community College.*

# Extras Decided Choice of Sort

*(Continued from Page 26)*

Pittari was pleased with the documentation of the Whitlow product and with the vendor personnel.

"I've talked to them many times and they are very knowledgeable about their product. They are schooled properly and give you straight 'info' when you call or within hours."

While the Whitlow people recognize when they have problems and the problems are generally resolved quite quickly, Pittari said he wished they would change the way the user has to prepare the sort for his environment.

Changes in the package are made by patching the object code with the use of IBM's ZAP utility, he explained; he would prefer getting a whole new program he could "gen" as an entity.

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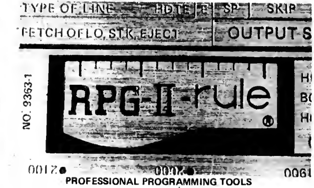

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# COMMUNICATIONS

## Vtam-Compatible Program Aids 3790 Communications

NEW YORK — Computer Dynamics, Inc. has developed an IBM Vtam-compatible Batch Communications Program (BCP) reportedly designed to transmit data between IBM 370 computers and 3790 communications systems more efficiently than IBM software.

The program allows 370 communications with an unlimited number of 3790 systems over switched or nonswitched lines, permitting its user to utilize the enhanced facilities available under IBM's System Network Architecture (SNA) and Synchronous Data Link Control (SDLC) line protocol, a company spokesman claimed.

It resides in the host 370 CPU operating under DOS/VS, OS/VS1 or OS/-VS2, he said.

The system includes a transmission control file which monitors the flow of data and is set up such that an unlimited number of files may be transmitted in either direction, the spokesman noted.

Although IBM offers the 3790 Batch Transfer Program, the Computer Dynamics software is said to be more advantageous because it allows recovery restart at any point in a transmission, in addition to communications up to four times as fast as IBM's.

When using the IBM program, a user must retransmit an entire file and cannot send multiple files or lines — another feature of the independent program, according to the spokesman.

### Detailed Report

A report is also produced detailing the activity, status and time of transmission, the company stated. The program provides a building block for Vtam communications. By using Vtam to control all communications activity, users can increase their throughput and receive the true advantages of IBM's SNA and Network Control Program, the spokesman explained.

The program also provides a link which can be incorporated as part of a total Vtam communications system and supports locally attached 3790 communications systems, he added.

Although a definite price has not yet been set by the firm, the spokesman said it will cost about $7,000.

Computer Dynamics can be reached at 10 E. 39th St., New York, 10016.

## Tymnet Unveils Ontyme As Data-Switching Option

**By John P. Hebert**
Of the CW Staff

TORONTO — Tymshare, Inc.'s newly formed subsidiary — Tymnet, Inc. — will introduce a terminal-oriented store-and-forward message-switching service at the International Communications Show here today.

Ontyme will be available as a public shared networking alternative, as well as a private in-house installation.

Tymnet's tariff application for the message service was granted approval by the Federal Communications Commission (FCC) effective April 1.

In its public shared service form, Ontyme was intended to provide an alternative to the TWX, Telex and other message switching services available from Western Union, Inc., according to a spokesman for the new Tymshare subsidiary [CW, April 11].

And in the private, nonshared form, Ontyme is said to offer its user the advantages of a dedicated, in-house message-switching system without the operational maintenance and initial start-up problems of a user-built computer system and network.

The service is expected to be available on or before July 1, the spokesman said.

Features include time- and date stamping of all messages, assignment of message sequence numbers, group coding for multiple destinations and monthly management reports for system control, Tymnet said.

Ontyme will deliver messages to the destination terminals by dial-out facilities or optionally hold messages within the system until the addressee calls in to receive them, the company added.

Features which are said to be unique to the new service include on-line message preparation facilities, on-line disk storage facilities for user storage of frequently used message data and on-line information describing the status of all recent messages relating to that user.

Other than a maximum transmission speed restriction of 1,200 bit/sec on user terminals, the service reportedly is terminal-independent.

### Transmission Charges

Ontyme charges are based on the number of characters transmitted and the time connected to the Tymnet network, but not on distance, the spokesman said.

There is a charge of 5 cents for each transmitted message. The cost to send a 500- to 1,000-char. message ranges from about 20- to 80 cents with the average cost being 30- to 40 cents, he said.

The present Tymnet network provides local access in 61 U.S. cities, which should be expanded to 105 cities by 1979. At present, the Bell System's Wats will be used to supplement the Tymnet network coverage to provide access to all points within the contiguous U.S., according to Tymnet.

Users in Tymnet high- and low-density access areas will benefit from the carrier's use of double checksums for error detection and the retransmission of any message blocks — which result in an error rate of one per four billion bits transmitted, between network nodes, Tymnet claimed.

Users requiring Wats will not have this advantage because of an error rate of 1/100,000 bits transmitted through Bell switching nodes, according to the spokesman.

The rates for the public shared message-switching service include a monthly service charge of $100, in addition to charges based on high- or low-density access locations and data transmission rate from a user's terminal.

### Area Charges

If the Tymnet access location is a high-density area, 110- to 300 bit/sec users will pay 4 cent/min. The minimum connect time for high-density areas, the company said,

(Continued on Page 32)

## To Upgrade Nets to SNA

## Some IBM Users Must Find Vtam Alternative

**By Ronald A. Frank**
Of the CW Staff

ST. PAUL — Many teleprocessing applications originated by users on IBM 360 mainframes that now run on 370s cannot be upgraded to a Vtam environment, according to William Gotschall, vice-president of Comten, Inc.

And software that cannot run under Vtam will not be compatible with a Systems Network Architecture (SNA) environment. As a result, users will have to find other alternatives if they want to upgrade their present data communications networks, Gotschall said here recently.

By combining Comten front ends with the firm's Communications Network System (CNS), it is possible to get many of the SNA features, even for users with earlier IBM access methods. As an example, users with Btam can have many of the multihost networking capabilities announced for IBM's Advanced Communications Function (ACF) if they use CNS software, Gotschall said.

Because of the complexity and cost in implementing an SNA network, users have been slow to upgrade. As a result, IBM has made some announcements it might not otherwise have considered, Gotschall said.

These include expanded Tcam support with the Network Control Program (NCP) in an SNA network and binary synchronous capabilities for the 3700 series of teleprinters. This latter series was originally meant to be SDLC-only equipment, but users were slow to accept that limitation Gotschall said.

### Excellent Basics

Although his company has capitalized on IBM's built-in SNA restrictions, Gotschall said, the basics of the network architecture are excellent. But implementation can take many forms and users should have upgrade paths that are not as limiting as IBM has defined.

The most costly and complex requirement for the user is the need to operate with Vtam in order to run SDLC hardware, he noted.

Comten has provided replacement front ends for the IBM 370X series together with specialized software that often gives the user more capabilities than a comparable IBM-only system, he said.

Although Comten does not make many public introductions of its products, the company keeps abreast of the latest IBM teleprocessing features. Most of the upgrades are software-oriented and they are compatible for use on existing or new systems, Gotschll indicated.

As an example, Comten currently has six test sites running in an NCP environment and some of these have dual hosts running on a single 370X-type front end.

### NCP Support

Later this year, Comten expects to introduce NCP support for binary synchronous and start/stop equipment. This will be significant to users who have such equipment and yet want the benefits of NCP for their networks, Gotschall said. IBM does not provide NCP support for this type of terminal equipment, he added.

Another capability planned for later this year will be NCP support for SDLC terminals.

The net effect of these software capabilities will be to allow users to mix all major types of terminals — both old and new — into one NCP-oriented network. This will prevent costly upgrades to Vtam for these users if they stayed in an all-IBM environment Gotschall said. More importantly, it will avoid having to obsolete older terminals because they are not compatible with an SNA environment, he noted.

The emergence of packet nets using the X.25 protocol standard "is more complicated than the outside world thinks," Gotschall said. Using the virtual call principles' overall responsibility for the transmission of data still rests with the front end and the terminal.

In addition, various layers of the packet interfaces still have to be implemented, he said. Because of these limiting factors, it will still be some time before large data communications users with in-house networks find a packet-switched net to be a viable alternative, he explained.

The emergence of satellite systems introduces additional problems that must be overcome — such as propagation delays, Gotschall stated, adding these are not insurmountable.

Several Comten users are already operating double hop systems of this type using a combination of terrestrial and satellite carrier facilities without affecting the successful transmission of their data, he said.

## Telenet Files Revisions to Public Packet Nets

WASHINGTON, D.C. — Telenet Communications Corp. recently filed tariff revisions with the Federal Communications Commission (FCC) for its public packet network.

The FCC filings include an across-the-board volume discount plan for Telenet users as well as a restructuring of network access charges, expansion of the Hot Line data service and the upgrading of Atlanta to a switching center for the southeastern U.S.

Under the volume discount plan, users with monthly billings totaling more than $5,000 will pay a lower rate on all charges above that amount. The size of the discount will range from 20% on monthly billings between $5,000 and $9,000 to 50% on billings totaling more than $18,000, Telenet said.

The public communications carrier said it will also reduce disparities in its three-tier rate structure for public dial-in service. High-density rates, which apply in 10 cities, will be increased from $1.40- to $1.80/hour.

### Low-Density Charges

Low-density charges, in effect in 16 cities, will be reduced from $4.80- to $4.20/hour. The rate for medium-density cities will remain unchanged at $2.40/hour, according to the company.

Telenet's Hot Line data service, which serves as the functional equivalent of a leased line between pairs of user stations, has been expanded to include stations operating at 50- to 110 bit/sec and 1,200 bit/sec.

The initial Hot Line offering at 134.5- to 300 bit/sec is now in effect under special permission of the FCC, Telenet noted.

And the central office in Atlanta will soon serve as the hub for network expansion in the southeastern U.S., making it possible to accommodate transmission speeds up to 56 kbit/sec in that area.

The majority of Telenet's tariff filings are scheduled to take effect on July 24, according to a Telenet spokeswoman.

### Cost of Service

The changes are not a reflection of Southern Pacific Communications Corp.'s revival of Data Transmission Corp.'s Datadial digital services [CW, May 9] or Bell Telephone's restructuring of its Wats rates, she said.

Rather, the rate differences result from Telenet's costs of providing the packet-switched network services, the spokeswoman noted.

Telenet is located at 1050 17th St. N.W., Washington, D.C. 20036.

# Telenet, ITT Jointly Providing Service to France, Puerto Rico

NEW YORK — ITT World Communications, Inc. (ITT Worldcom) and Washington, D.C.-based Telenet Communications Corp. have begun providing a joint, packet-switched data communications service between the U.S., Puerto Rico and France.

The interconnection service was designed to handle communications between computers and terminals operating at speeds from 10- to 30 char./sec.

ITT Worldcom is furnishing the overseas data transmission facilities and gateway switching equipment here, linking Telenet network users in the U.S.with packet switching facilities abroad, the companies stated.

### Transmission Charges

Communications between the U.S. and Puerto Rico will cost users $10/hour plus an additional charge of 45 cents per 1,000 char. transmitted, according to a Telenet spokeswoman.

Users in the U.S. can transmit through the gateway switch here to Paris and will be charged $14/hour, in addition to a charge of 70 cents for each 1,000-char. and local distribution charges here and in France, the spokeswoman indicated.

Users located anywhere in France can access the Paris switch via the French Postal Telephone and Telegraph net and transmit data at the same cost charged to U.S. users, in addition to the local distribution charges on Telenet's network, she said.

ITT Worldcom can be reached at 67 Broad St., New York, N.Y. 10004. Telenet is headquartered at 1050 17th St. N.W., Washington, D.C. 20036.

# Kewau Has Port Expander

YPSILANTI, Mich. — Kewau Enterprises, Inc. has introduced a universal port expansion system for process control, energy management, point-of-sale (POS), credit checking and other applications.

The Series 7700 consists of a cluster controller and up to 32 remote parallel I/O interfaces, the company said.

It reportedly provides full-duplex communications at a preset rate up to 9,600 bit/sec through each RS-232 port of the host processor.

Remote interfaces are individually addressable and feature an 8-bits-plus-strobe parallel I/O and polled receive/transmit capabilities. The interfaces require a four-wire, 20mA current loop, Kewau said.

The cluster controller and remote interfaces include a built-in power supply.

Options to the Series 7700 expansion system include current loop or TTL cluster controller I/O and remote interfaces for peripherals, the company noted, adding seven optional transmission rates of 110- to 4,800 bit/sec are available.

Prices for the Series 7700 cluster controller start at $1,800; remote interface prices begin at $300 each, Kewau said from 1750 Sheffield Drive, Ypsilanti, Mich. 48197.

# Tymnet Offers Ontyme Service

*(Continued from Page 31)*

will be 2.5 minutes.

Users of 1,200 bit/sec terminals will be charged 6 cent/min, according to the FCC tariff rates.

The low- or high-speed terminal users will pay 8- or 10 cent/min respectively and must be connected for a minimum of 2 minutes.

There are charges of 12- and 14 cent/min for low- and high-speed terminal users accessing the Tymnet network from Foreign Exchange areas; the Wats usage costs 25 cent/min regardless of terminal transmission speed.

Wats users will have to be connected for a minimum of 1 minute, according to the firm.

### Private Access Ports

Private access ports for the message switching services cost $125/mo or $175/mo for users with low- or high-speed terminals respectively in high-density areas, in addition to a nonrecurring $200 installation charge, according to the tariff.

Users in low-density areas desiring a private access port will be charged $175- or $225/mo for the low- and high-speed terminals, respectively, in addition to the $200 installation charge, it stated.

For terminals operating at 110- to 300 bit/sec, the cost per 1,000 char. transmitted is 12 cents. Users of 1,200 bit/sec terminals will be charged 5 cents to transmit 1,000 char.

Tymnet, Inc. can be reached at 10261 Bubb Road, Cupertino, Calif. 95014.

# Norland 2301 Permits Channel Signal Averaging

FORT ATKINSON, Wis. — Norland Instruments Model 2301 reportedly expands the firm's 2001A waveform and data analysis systems by adding the hardware and software needed for high-speed, multichannel signal averaging.

The 2301 works with any Norland signal acquisition plug-in module and can provide up to four channels of simultaneous signal averaging, the company said.

Data can be acquired at a 1 microsec sample rate with throughput up to 200,000 sample/sec, according to the firm. Resolution can be selected in units from 5 to 12 bits.

The Model 2301 costs $3,500 from the company at Norland Drive, Fort Atkinson, Wis. 53538.

# Bell-Type Modem Bows

FORT WASHINGTON, Pa. — Tele-Dynamics has a 4,800 bit/sec, Bell 208-compatible modem for operation with both dial-up and private lines.

The Model 7208 has an all-digital adaptive equalizer which is said to allow maximum convergence and present drifts and other analog errors on marginal unconditioned and other lines.

Both 7208 versions have built-in on- and off-line test capabilities with 10 diagnostic lights and a front-panel control.

The modem costs $2,750 and the conversion option costs an additional $300, the spokesman said from 525 Virginia Drive, Fort Washington, Pa. 19034.

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| Automatic scratching of tapes | Yes | — |
| Simple interface to OS | Yes | — |
| Scheduling and control of tapes being moved to off-site location | Yes | — |
| Automatic uncataloging of scratch tapes | Yes | — |
| Non-quiesing of tape jobs while backing up the master | Yes | — |
| Unchanged JCL for users | Yes | — |
| Non-degradation of system performance | Yes | — |
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## System Pays for Itself Annually

# PACX Dissolves User's Fear of CPU, Line Expansions

By Phil Dylhoff

Special to Computerworld

Our need for a better data communications/switching system was brought to the foreground in 1975 when the University of Iowa decided to expand its computing facility.

Another Hewlett-Packard Co. HP 2000 system was to be added to the existing services which included an IBM 360 and three other HP 2000 systems. Further expansion of the existing combination of dedicated and dial-up telephone lines didn't seem attractive.

What we wanted was faster communications, the ability to reconfigure the system ourselves and the opportunity to take advantage of spare time available on ports equipped with dedicated communications when the associated terminals were not in use.

Above all, a simple, straightforward expansion capability was considered vital.

The inherent disadvantages of using the telephone switched network prompted a wider investigation which turned up the Gandalf Data, Inc. Private Automatic Computer Exchange (PACX).

Extensive consultation with the manufacturer confirmed that this system would not only meet our operating requirements, but offered the following additional benefits for both users and management:

- Substantial reduction of line and modem rental charges would be achieved since local terminals could be connected using limited distance data sets over dedicated lines.
- Data rates could be dramatically improved from the usual 300- to 2,400 bit/sec. The equipment will run at 9,600 bit/sec, but at present, our computers are not configured to keep up.
- With the switching system located in the computer room, the system is easily reconfigured without Bell intervention.
- Current status of all ports and terminals is displayed by a full complement of indicators.

The system enables up to 254 terminals to contend for service on a "first come, first served" basis, from as many as 126 computer ports. The exchange is totally transparent to data speed, code or format.

The unit is controlled by a high-speed semiconductor memory, organized such that each memory address corresponds to a unique port channel, while the content of that address corresponds to the terminal channel to which the port is connected.

User requests for service or disconnections are accomplished by updating the memory contents to reflect the new status.

### 64 Class Codes

With the previous system, rotary groups of telephone numbers corresponded to each of the available computer services. The PACX system provides for up to 64 class codes which may be assigned to the various services.

These designations are stored in another port of memory, again with addresses corresponding to the ports. Gandalf's Local Data Sets have an integral two-digit thumbwheel switch to permit users to "dial" the desired service class.

Service is then requested by switching on the data set. The exchange recognizes the request, "reads" the class code and searches its memory for an available port of that class.

If one is available, the connection is established and the user receives a ready indication; if not, the user gets a busy indication and is disconnected.

The sequence takes less than one second and is independent of system loading. In fact, the system does not "load up" creating service delays or reduction in data rate.

All 126 port channels can be connected simultaneously and handle full duplex data at 9,600 bit/sec for an effective aggregate throughput of about 1.1M bit/sec in each direction.

### Ease of Expansion

The ease of expansion has been of particular value; we started with a small system servicing only 32 ports and 32 terminals. By simply plugging in additional printed circuit boards, we now have 126 ports serving 83 CRT terminals, six graphic terminals and 108 printing terminals.

The system will soon be upgraded to provide a total potential capability of 254 ports and 510 terminals.

As supplied, all Local Data Sets — using the thumbwheel switches — could request any of the 64 service classes. We've made a simple hardware modification to most data sets, limiting the capability to 32 codes, still more than adequate.

Data sets at selected locations only are left with the full 64-code capability and can thus access our "restricted" services which are assigned the higher codes.

This arrangement enables us to allow access to all aspects of a data base except, for example, financial data which can be accessed only by authorized personnel.

With the previous dial-up system we had a few problems with theft of services — we could tell a port was being used illegally but had no way to identify the connected terminal since we could not determine where the telephone call originated.

Now, the terminal can be identified immediately from the PACX control panel and security personnel dispatched to catch the offender in the act. Growing awareness of this capability has also reduced the incidence of theft.

In addition to the operating benefits, the PACX system has yielded substantial cost savings over the traditional approach. Our total cost for line rentals, etc. is now only $670/mo whereas a dial-up system of equivalent capacity would cost $4,760/mo and be less functional.

Applied against the purchase price, the saving pays for our system, in effect, about every 12 months.

Gandalf's equipment has proved to be exceptionally reliable. We've had the occasional single-channel failure. However, these do not affect the rest of the system which has provided 100% up-time since installation.

*Dylhoff is manager of telecommunications and maintenance at the University of Iowa Computer Center.*

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### Net Saves $50,000 Monthly

# Burns Ensures Its Own Security With Intelligent Units

BRIARCLIFF MANOR, N.Y. — For the nearly 30,000 clients of Burns International Security Services, Inc. and its subsidiaries, a DP system and a network of 50 intelligent terminals means more timely, cleaner invoices.

And for Burns itself, headquartered here, it means a smoother operation, more satisfied customers and a monthly gross savings of $50,000 as a result of reductions in mail costs, courier costs and clerical services, according to a spokesman.

When first considered six years ago to alleviate the turnaround problems inherent in a centralized DP operation, a teleprocessing system using leased lines was not cost-justifiable.

In 1974, however, when the company found intelligent terminals which could be used in conjunction with regular telephone dial-up networks, Burns' management could be convinced of the practicality of making a commitment to teleprocessing, the spokesman said.

Since that time — when error rates and correction rates sometimes ran as high as 30% of an office's input volume — errors have been reduced to about 1%; turnaround time has been cut from a week or more to less than 24 hours, he noted.

"And because we have been able to clean up our input for payroll and other applications," Mike Ivany, systems manager for Burns and one of those responsible for implementing the system, added, "we have a better cash flow position and a much smoother, more flexible operation."

Prior to the implementation of teleprocessing, field offices sent payroll and billing data on source documents via the postal service, buses and couriers to headquarters for keying on a centralized key-to-disk-to-tape unit and subsequent editing on the company's IBM 370/135 mainframe.

## Terminal Transactions

Once printed, edit reports were checked for erroneous data against source documents and batch totals were compared; any corrections made at that point were only to keying errors made in the data entry section.

The final product was then whisked away by couriers to air and land carrier facilities for shipment back to the originating offices. Occasionally, packages did not arrive on time. Sometimes, packages did not arrive at all.

Today, existing telephone facilities have replaced Burns' reliance on commercial carriers and a decentralized processing philosophy has replaced the central data entry pool.

"Now the burden of getting data in and on time has been placed squarely on the branch offices," Ivany explained. "Field offices are responsible for timely data preparation, whether it is the result of original source data or error correction."

"Not only has the quality of data improved, but my efforts are now concentrated on quality control rather than on data entry and control totals verification," according to Irene Taylor, quality assurance manager.

Burns relies on Sycor, Inc. Model 340 terminals for validating data, performing a variety of editing functions including range and validity checks and verifying check digits and batch balancing.

During the keying process, if a batch total at the bottom of a page is out of balance, the terminal is instructed to backspace to the first record keyed for that page.

The operator can then check each keyed record visually on the 576-character CRT — replacing incorrect records with correct ones, deleting extra records or adding records skipped — then move to the bottom of the page to rekey the batch line to make sure everything is in balance.

The data, stored on cassette, is then polled by two Model 340 master station units with automatic dialing facilities. Once all data has been collected, it is processed on Burns' computer for editing, file matching and updating and report generation.

Output reports are written onto magnetic tape and then retransmitted by the master stations to the originating offices, where the reports are printed out on attached Sycor printers so they are ready when clerical personnel come to work in the morning.

# Ramtek CRT Available in B/W, Color; Features Intelligence, Programmability

SUNNYVALE, Calif. — Ramtek Corp. has introduced a programmable terminal system with a CRT available in both black and white (B/W) and color that is said to combine the best features of graphics and alphanumeric terminals.

The Micrographic terminal features an industrial-quality monitor with graphics resolution of 512 elements by 256 lines. The independent alphanumeric refresh offers single-character addressability within a 25-row by 80-character matrix, according to the firm.

Users can select eight of a possible 64 colors for displayed graphics or characters. In the B/W version, the system can drive up to three independent channels. It also features composite, split- or dual-screen capabilities.

Internal operations are controlled by a microprocessor with up to 28K bytes of programmable read-only and random-access memories.

The user can purchase or develop terminal control software. When under control of Ramtek-furnished software, the Micrographic provides teletypewriter compatibility and graphics functions as commanded by Ascii text strings transmitted from applications programs in a host CPU.

The terminal's Ascii keyboard includes 128 key codes and up to 40 keys for numeric, cursor and special functions, the firm added.

It can transmit data synchronously or asynchronously at selectable speeds from 110- to 9,600 bit/sec in half- or full-duplex and character or block modes from three serial ports. RS-232C or 20mA current loop interfaces are available, Ramtek said.

Other options include a floppy disk interface, additional serial I/O ports, alphanumeric overlay, user-defined fonts and packaged software.

Micrographic prices begin at $4,700 for a basic B/W system and $5,400 for the color version; quantity discounts are available.

Deliveries are scheduled for July, the company said from 585 N. Mary Ave., Sunnyvale, Calif. 94086.

# Calcomp Interactive Graphics CRT Includes Micro, Display Memory

ANAHEIM, Calif. — California Computer Products, Inc. has an Interactive Graphics Terminal (IGT) for the display and manipulation of computer graphics output.

The IGT houses a microcomputer and display memory to allow user-controlled functions such as pan, zoom, cursor tracking, grid generation and variable display of foregrounds and backgrounds, Calcomp said.

The basic configuration includes the processor, CRT, RS-232C interface and full Ascii keyboard.

IGT configuration options include a parallel interface to host CPUs and a data tablet, the company added.

Supporting software is included to handle display features, keyboard, cursor pad and the RS-232C interface control. Optional Tektronix, Inc. Plot 10-compatible software is available as well as various Calcomp-compatible software for some host computers, according to the firm.

The IGT offers a local mode, input from the computer and interactive mode operation. Transitions to the three modes are controlled by the host CPU or the terminal keyboard, Calcomp noted.

The terminal costs about $14,700. First deliveries are scheduled for September, the company said from 2411 W. La Palma Ave., Anaheim, Calif. 92801.

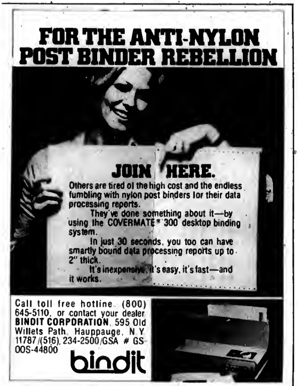
## Modules Eliminate Display Distortion

NEWTON, Mass. — The Intronics, Inc. C104 and C104B correction modules are said to correct geometric and focus distortion in flat- and semiflat-faced CRTs using magnetic deflection.

The modules produce wideband corrected output functions for horizontal and vertical deflections plus dynamic focus, Intronics said.

Applications include air traffic control systems, graphic display systems and medium-priced terminals.

Prices for the C104 and C104B are $395 and $275, respectively, Intronics said from 57 Chapel St., Newton, Mass. 02158.



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# Terminal Transactions

# Siemens Brings Out Teleprinter, Telex Replacement

ISELIN, N.J. — Siemens Corp. has introduced two teleprinters aimed at communications and computer I/O applications.

The T-1000 is an intelligent device which utilizes MOS and LSI chips, a buffer storage unit, a self-diagnostic unit and a daisy wheel printing mechanism, according to the firm.

The central control within the T-1000 consists of seven MOS switching modules. The teleprinter's answerback, line interface, keyhoard control and other functions are tied to the controller, Siemens said.

A variant module group allows more than 50 preprogrammed additional functions such as character feed suppression and the selection of certain symbols by the insertion of wire or diode straps, the company said.

The digital keyboard keys, rather than a rotary dial, are used to initiate Telex connections, it noted.

The T-1000 prints at selectable forces and speeds of 50-, 75- and 100 bit/sec, a spokesman added.

The PT 80 printer is also modular and consists of a keyboard, 9 by 12 dot matrix print mechanism, interface adapter, power supply, control panel and central device controller.

A tape reader, tape punch or magnetic cartridge unit can be attached to the terminal; the answerback unit is contained within the PT 80, the spokesman noted.

Because the terminal uses Ascii code, it can be used for installations needing TWX communications to supplement or replace Telex communications that use a 5-bit code, he said.

The PT 80 prints 80 char./line at speeds up to 90 char./sec on 9.9-in. fanfold paper. It can be used as an interactive terminal in computer time-sharing, a remote CPU output printer, a CRT peripheral device or a TWX machine, according to Siemens.

The T-1000 costs $3,460 in its basic form and the PT 80 is priced at $3,600, the spokesman said from 186 Wood Ave., S., Iselin, N.J. 08830.

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# Harris Adds Printers for 1600 System

DALLAS — Harris Corp. has added three remote printers for use with CRT terminals in its Model 1600 distributed processing system.

The models 1676-99, 1676-88 and 1676-15 printers enable users of Harris Model 1675 CRTs to produce hard copies of displayed data or receive formatted reports from the 1600 system through the CRT, according to a spokesman.

A combination of printers and CRTs can be installed remotely and linked by communications lines or hard-wired to a local 1600, he said.

Typical applications for the remote printer/CRT combination are expected to be source data entry, local data base interaction, order production, warehouse inventory and material control, Harris said.

The Model 1676-99 is a 90- to 240 line/min belt printer; the Model 1676-88 is a remote matrix printer which operates at 88 char./sec; and the 1676-15 is a 15 char./sec remote impact printer, the spokesman stated.

The belt printer costs $9,460; $5,500 is the price for the matrix printer; and the Model 1676-15 impact printer costs $2,640.

A "typical" configuration with a Model 1675 CRT and the 88 char./sec matrix printer for a 1600 system leases for $245/mo, including maintenance, and has a purchase price of $8,088, the spokesman said from 11262 Indian Trail, P.O. Box 44076, Dallas, Texas 75234.

## On-Line Data Entry Unit Features Microprocessor-Based Functions

WESTWOOD, Mass. — Computer Identics Corp. has introduced an on-line data entry terminal with a hand-held bar code reader, numeric keyboard for supplementary data input and microprocessor-based decoding.

The Fixed Code Processor Model II (FCP-II) was designed to speed and improve the accuracy of source data collection by minimizing intermediate DP functions, the vendor said.

The unit's microprocessor receives, decodes, verifies and transmits complete messages, including any data entered via keyboard, directly to the user's computer system, the company said.

Completed transactions are acknowledged by audio and visual signals. The standard FCP-II decodes both interleaved and conventional "two of five" codes. Other codes are optional, a spokesman added.

Other features include a 16-digit, split-field LED display; selectable interface and transmission modes; and 10 switch-selectable asynchronous transmission rates from 110- to 9,600 bit/sec.

The basic terminal costs $2,160 and includes the scanner, a 16-key keyboard, LED display and the code-reading capability. An FCP-II with full alphanumeric keyboard costs $3,200, the spokesman said from 31 Dartmouth St., Westwood, Mass. 02090.

## *HP Aims CRT Display At Graphics Users*

PALO ALTO, Calif. — The Model 1304A CRT from Hewlett-Packard Co. is said to provide the resolution necessary to display 2,000 alphanumeric characters in normal room lighting.

The 1304 is driven electrostatically rather than using magnetic deflection. It is aimed at applications such as graphics display for calculator or computer systems in addition to medical applications, the company said.

The display tube is priced at $2,400, a spokesman noted from 1501 Page Mill Road, Palo Alto, Calif.

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## *Informer Model 303 Gets Larger Screen*

LOS ANGELES — Informer, Inc, has added a 9-in. CRT screen to its microprocessor-controlled Model 303 terminal.

The CRT, three inches larger than the previously available screen, permits 1,920 characters of information to be presented in a 24-line by 80-char./line format, is pedestal-mounted.

Up to three screens can be attached to one Model 303 console. In the basic configuration, a 303 with one 9-in. CRT costs $3,720, with quantity discounts available, the spokesman said from 8332 Osage Ave., Los Angeles, Calif. 90045.

## *Percom Adds Interface*

GARLAND, Texas — Percom Data Co. has a high-speed, self-clocking cassette/terminal interface for the Southwest Technical Products Corp. 6800 microcomputer.

The CIS-30+ kit costs $69.95; assembled, it costs $89.95, and includes an instruction manual, Percom said from 4021 Windsor, Garland, Texas 75042.

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## Though Gaining More Attention

# Distributed Processing Seen Lacking Understanding

**By Harvey L. Poppel**
**And William C. Michels**
Special to Computerworld

Distributed processing is continually drawing more and more attention, yet has a meaning that is not totally understood.

Distributed processing is an evolution from centralized processing, which in turn evolved from "free-standing" modes. Though it combines certain strengths of its two predecessors, distributed processing is totally different and unique in its own right. It represents a break from the past.

Because distributed processing provides management with so much flexibility and can be applied in so many different ways, it is rarely perceived in the same light by its many users. It can mean different things to different people.

Probably the best way to define the term is to examine each of the two words individually. Processing describes not only arithmetic calculations, but the logical functions that take place:

- Source/use — the human processing steps.
- Electronic translation — the encoding/decoding of information at the human-machine interface points.
- Communications translation (in those data systems with telecommunications) — encoding/decoding and control of information to, from, or through the transport function.
- Transport — electronic transmission.
- Storage — transient or permanent.
- Synthesis — changing the meaning of information.

In any complex system, these six logical functions can be served by numerous arrays of physical components (terminals, controllers, networks, etc.), each array representing a different "processing" architecture or distribution.

In a centralized architecture for a data system without telecommunications, the logical functions are usually concentrated in one physical location.

But in those systems that have telecommunications, some of the functions — source/use, electronic translation and transport — can be local and/or remote (using "dumb terminals"), although storage, synthesis and most communications translation typically are centralized.

### Three Dimensions

By "distributed," most practitioners are really referring to one or more of three possible dimensions of redistributing a hitherto centralized architecture:

- By type of processing — separating communications processing from DP functions, using such physical components as front ends, intelligent terminals and smart network switches.

In such a distribution, the integrated network often becomes the focal point of the architecture. In some respects, this is the easiest type of distribution to achieve because it is relatively transparent to users and does not require application systems redesign.

- By application — isolating cash management, customer service, design/engineering or other distinct application systems as "standalones," typically using mini or small computers (these applications may communicate with other application areas, but only after primary synthesis and/or storage is locally performed).

The design focus here shifts to the transaction flows either within or among departments. This type of distribution is usually not too difficult to achieve, since many individual applications can be isolated.

- By organization unit — designing all applications to match some form of organization structure such as a division, branch office or plant.

This form of distribution is nearly synonymous with decentralization. Such a shift from centralization to decentralization, however, is often the most difficult type of redistribution to accomplish because of associated shifts in organizational responsibilities and the major changes required in information flows.

For some businessmen, distributed processing means greater efficiency of their transaction flows and increased productivity of the associated information resources.

For others, it means enhanced customer service by reorganizing personnel and data on a customer rather than functional or product basis.

For still others, it means tighter management control of organizational units.

Regardless of use, distributed processing provides management with a tool to improve performance. Unfortunately, some information managers pay more attention to achieving the most elegant distributed processing design per se, rather than concentrating on the real objective of the system, which is to generate results.

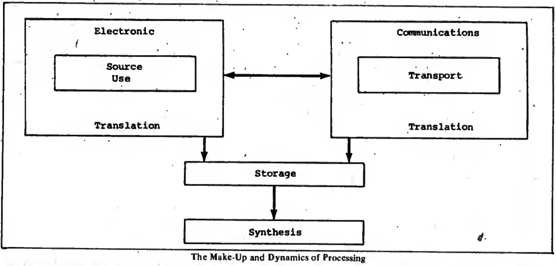
Worse still, managers may regard the distributed processing movement as a threat to their own proven ways of doing things. This need not be.

Distributed processing is not for everyone; but for those who can utilize it successfully, the payoffs are often high.

### Formidable Challenge

In many organizations, data can be redistributed along a single application with no problem. But in large organizations that require a total redistribution of processing,

*(Continued on Page 40)*



The Make-Up and Dynamics of Processing

# CDC MMDs Utilize Fixed Sealed Modules

MINNEAPOLIS — Control Data Corp. has introduced mini module drive (MMD) random access storage devices which utilize fixed, sealed modules for the storage medium.

The MMDs are available in two models and are both format- and interface-compatible with CDC's family of storage module drives.

The MMD family includes the 9730-12 (12M-byte) and 9730-24 (24M-byte) units, according to a CDC spokesman.

The basic drive includes a frame on which the following components are mounted: drive motor, power supply, electronics, front panel and sealed module. The sealed module contains the spindle, media, rotary actuator and heads.

An optional head-per-track shoe can also be mounted within the sealed module, the spokesman noted.

The unit is designed to accommodate either horizontal or vertical mounting to provide maximum flexibility, he claimed.

### Performance Characteristics

The performance characteristics of the MMD include a data transfer rate of 1.2M byte/sec with a spindle speed of 3,600 RPM and a density of 6,220 bit/in. Access times average 40 msec with a maximum full stroke access of 60 msec and a minimum one-track seek time of 14 msec.

The medium has a 14-in. diameter and is magnetic oxide coated and lubricated. The unit has contact start/stop, 3340-type heads.

The unit reportedly has an 8,000 hour mean time between failure with a service life of eight years. It has a recoverable error rate of not more than one error in 1012 bits transferred, the spokesman added.

The 9730-12 costs $3,100 and the 9730-24 costs $3,500. The firm can be reached at Box 0, Minneapolis, Minn. 55440.

# Amusement Parks Profit From Data Entry System

DOSWELL, Va. — An intelligent terminal system used by two theme amusement parks here is helping to improve data entry efficiency while lowering data entry errors.

In addition, it helps make sure that Yogi Bear and Fred Flintstone get their correct paychecks.

Payroll at Carowinds Amusement Park balloons from less than 200 in the off season to more than 2,000 during the summer and includes hundreds of high school and college youths who portray various Hanna-Barbera cartoon characters and operate the rides and restaurants.

Employee turnover is high during the season and that has always posed DP problems, according to James Dunn, assistant director for DP at Taft Broadcasting Corp., which operates the two theme parks.

This season, however, a PTS/1200 intelligent terminal system from Raytheon Data Systems Co. is expected to improve the efficiency of data operations at Carowinds and its "sister park" — King's Dominion — by nearly 40% while reducing data entry errors by approximately 90% and saving between 30 minutes to one hour of host processing time each week, Dunn said.

The system capabilities provide the key to those three benefits, Dunn indicated.

"The improvement in data entry efficiency is a direct result of concurrency — the ability to transmit, receive and process data on the same Raytheon system at the same time, under the same operating system," Dunn said. "The reduction in data entry errors and the saving in machine time are the result of the editing capabilities of the terminal system."

The initial PTS/1200 system, including a terminal control unit with 64K words of memory, four display stations, three 2.5M-byte disk drives and a 300 line/min. printer, communicates via IBM 2780 protocol with a Univac 9030 computer at King's Dominion.

Taft Broadcasting recently installed a second PTS/1200 system here, identical to the first, and has ordered a third Raytheon system for installation at King's Island, a third Taft theme park near Cincinnati.

The system at King's Dominion was in full operation two days after installation. According to Dunn, the system could have been operational "within an hour." He attributed the "delay" to recompiling made necessary by management's decision to code and store certain data unique to each park.

The programmable terminal system replaced a Data 100 Corp. Model 70 batch terminal at Carowinds, Dunn said.

"Every time we wanted to send a batch of records to King's Dominion, our three terminal operators had to stop what they were doing.

"We had to bring up a different operating system, and we had to wait until the transmission was finished or until processed reports had been received. Some of our more detailed reports would take up to two hours to print out," Dunn said.

"I would say we wasted an average of three hours each day and would have wasted more if we had not arranged our schedule around the limitations of our equipment," he added.

The batch terminal which proceeded the Raytheon system offered only the ability to validate record fields as either alpha or numeric, Dunn noted.

"The editing capabilities of the PTS/1200 system are as powerful as those available on any large computer," he stated.

"Data entry errors had been killing us, but when the park opens this season, we expect our data entry error rate will be under 1%, and we expect to have practically no computer rerun time attributable to data entry errors."

Dunn estimated that the editing features

*(Continued on Page 40)*

# Food Retailer Finds Conversion to POS 'Not a Trauma'

EDINA, Minn. — Converting from mechanical cash registers to point-of-sale (POS) equipment linked to dual CPUs in the first of a chain of food stores "was not the trauma I thought it might be," according to Don Byerly, president of Byerly Foods here.

"I was concerned with the 'downtime' we had been experiencing with our mechanical cash registers and if there is any one thing that can cause negative reactions in the minds of customers, it is faulty or slow checkout.

"Besides, it is the heartbeat of any store's operations in terms of control and efficiency. The more business you do, the greater the need for cash control and tighter accounting procedures," Byerly said.

### Developments Studied

Byerly had been studying for some time the development, by various manufacturers, of electronic front-end equipment. From his standpoint, the timing seemed right to perform an in-depth study to determine its feasibility for Byerly Food Stores.

"The number of companies offering electronic front-end equipment when I started my study a few years ago was impressive, but for one reason or another, many fell by the wayside by the time I made my decision," he said.

The equipment selected by Byerly was a Univac key-entry Accuscan system.

Asked why he had selected Accuscan, his answer was "confidence in Univac as an organization, its background, resources and staying power."

"Beyond system capability, I had to be sure Univac intended to stay in the business of electronic front-end equipment. I'm convinced this is the case."

### Independent Retailer

An independent retailer, Byerly Foods is a Super Valu customer. "The people at Super Valu were helpful because they had been conducting their own independent study of such equipment on behalf of member stores," Byerly said. "They were very positive toward the Accuscan system.

"In fact, when they completed their study, their recommendation to the management of all Super Valu stores was Accuscan for computer-driven front-end systems.

"Consequently, they have negotiated a long-term purchase and service agreement with Univac which aids all Super Valu stores in terms of cost/performance. Even though I contracted for my system before the Super Valu/Univac agreement, I still benefit," Byerly said.

The initial system was installed in Byerly's biggest store, here in Edina, in the summer of 1976.

"I felt I could best evaluate its performance where my office is. It's also where my accountant and assistant are. It seemed a logical decision," he said.

### System Components

The Accuscan system installed at Byerly includes the following components:

- A dual control center with dual disks and dual CPUs for full redundancy. Each disk has 128 tracks which can hold up to 655,000 bytes of information.

If, for any reason, one control center ceases to operate, the second system takes over with no loss of data.

- Fourteen front-end registers, each with a keyboard, printer, dual cash drawers and alpha display (18 character full alphanumeric dot matrix display).
- Two remote courtesy registers.
- One office register for system interrogation.

Asked about the installation of Accuscan, Byerly said, "Independent retailers feel strongly about how they want their systems to work and I'm no different. I thought there might be some flak when I wanted a number of programming modifications — but there wasn't.

"I thought that was a tribute to the Univac personnel and the flexibility of the equipment itself. As for postinstallation service — I cannot imagine how they could have done a better job. The changeover was not the trauma I thought it might be."

### 'Hard Results'

Asked about "hard results" after almost seven months of using the Accuscan system, Byerly said he had experienced the following:

- "Increased checker productivity — approximately 15% to 20%. Our customers get through the checkout counters and on their way faster."
- "More accurate information and quicker. I can get up-to-the-moment sales data by pressing a button — and I can get up to nine departmental breakouts — not to mention what customers are buying, on a percentage basis, by department. This allows quicker reaction on a more informed basis to fulfill purchasing requirements."
- "Lower losses due to bad checks because we've included a verification feature in our program to detect possible poor risks or previous bad check experience on the part of individual customers."

The benefits received from the first system in the first store have since led to Byerly Foods placing orders for additional POS systems for the chain's other two stores.

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PS: Vadic has shipped over 125,000 modems to date.

DATA COMM NEWS
VADIC "Firsts"

1969 — Vadic designs complete OEM line of low cost Bell compatible 300 & 1200 bps modem modules & PC boards for terminal & computer systems manufacturers.

1970 — Vadic adds IBM & CCITT compatible modems.

1971 — For end-users, Vadic introduces 16 channel system where up to 16 modems & auto dialers can be freely intermixed in 7" high chassis.

1972 — Vadic adds powerful displays & diagnostics, including EIA interface status lights, and local/remote loopback, making it simple to pinpoint problems on any part of a complex data communications system.

1973 — Vadic announces world's first full duplex 1200 bps modem that works on dial-up or two wire leased lines. Called "the most significant advance in modem design in years".

1974 — Vadic designs system which permits 60 modems to share a single automatic dialer. Vadic introduces 2400 bps modem.

1975 — General Electric now installs, leases & services Vadic modems at 50-plus service centers in US. 100,000th modem shipped by Vadic.

1976 — Vadic is first modem manufacturer to obtain certification for direct connection to switched network in California eliminating need for Bell DAA.

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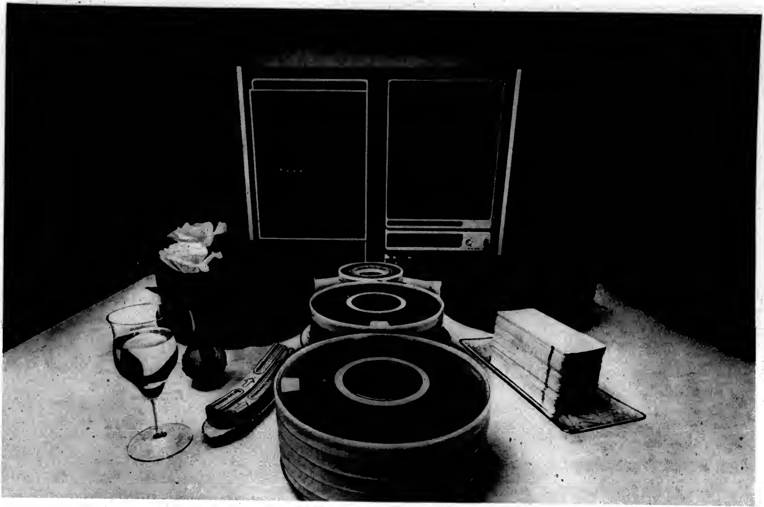

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# Data Entry System Aids Amusement Parks

(Continued from Page 37)

of the system will save between 30 minutes to an hour of machine time each week on payroll applications alone and will reduce the front-end editing load on the Univac processor by as much as 5 hours per week, overall.

Applications for all three PTS/1200 systems in addition to payroll include an employee master file. accounts payable, cash receipts, disbursement, payroll budget file, assets and depreciating, general ledger reports; financial budget comparison analyses and three classes of inventory transactions. In addition, the systems will provide marketing statistics and prepare marketing labels and front-gate tickets.

"We were attracted to Raytheon because [it] offered a 'multienvironmental' capability, such as the option of communication with a host while at the same time entering data, printing a report and inquiring to a local data file," according to Donald Atkinson, DP director.

"The only other vendors we saw with comparable capabilities were Digital Equipment Corp., Data General Corp. and Basic/Four Corp., but we found Raytheon software to be much better than that of the others," Atkinson continued.

"We prepare our payroll and our profit and loss budgets locally, and Autoquery allows us to hreak those files down to the level of the individual cost centers," he explained.

"In our budget planning applications, Autoquery permits the interrogation of files for the recall of any selected number of elements; for example, the labor budget for any individual stand at Carowinds for any individual payroll period ending date. Those files can be easily updated.

"In another budget planning instance, we can use Autoquery to call out the cost of any live show planned during the season. We can edit that budget or, if necessary, drop the show and delete the entire file."

Autoquery was one of the Raytheon software features which saved Taft a great deal of programming time, reduced keypunch and total clerical effort and saved mainframe computer time by reducing edit runs, Atkinson added.

### Parametric Editing

For example, the system performs parametric editing checks to ensure that account numbers, department numbers and similar data are valid. It then prepares an accounts payable batch listing and prints a local report which includes the accounts payable balance, Atkinson explained.

Then, based on the schedule at Carowinds, an accounts payable run at King's Dominion can be generated from a Raytheon terminal at Carowinds while other work continues at Carowinds on other terminals.

"That remote job entry capability is not common among data entry terminals," he added.

"Because of the high volume of data at the parks during the summer, we have often been at least a week behind in the processing of various personnel transaction requisitions," Dunn said.

"We're planning to install a terminal in Personnel and are programming the system to enable them to call a personnel record onto the display screen simply by keying an employee number."

Reports will be generated only by request, so Taft expects to be able to reduce paperwork and keep files up to date while cutting keystrokes dramatically.

"It's obvious that we will also save money," Dunn added.

# Distributed Processing Not Totally Understood

(Continued from Page 37)

the task may become formidable.

A major move away from centralized processing often involves a concurrent move toward two or call three dimensions of redistribution — type, application and organization. Such a complex redistribution may require a major overhaul of information resources, taking as long as six to 12 months to plan and three to five years to execute properly.

Anticipating the potential magnitude of time and commitment, most companies are smart to invest in a tightly prescribed initial effort to evaluate feasibility and explore alternative conceptual designs. Their evaluation should cover the following:

- Application systems selection — which application systems need to be redistributed, why and in what sequence?
- Application systems architecture — for each selected system, how do the major transaction flows translate into logical functions to be performed, and where will the source/use functions be located?
- Human resources — what numbers and mix of people should implement, operate and maintain the system(s)?
- Technical resources — how should the remaining five sets of logical functions (besides source/use, addressed above) be distributed, sourced and implemented in terms of specific physical components?
- Management control — what new techniques are needed to plan, implement and maintain changes of this magnitude?
- Organization — to what extent does the redistribution of human and technical information resources require a redistribution of organizational responsibilities?

Companies that invest initially in a broad but disciplined feasibility and project planning effort are most likely to view distributed processing in a total perspective.

The challenge to management is to grasp not only the anticipated payoffs, and the dimensions of distribution likely to realize those payoffs, but how to migrate the redistribution without extraordinary investment and risk.

*Poppel is senior vice-president and Michels is a consultant with Booz, Allen & Hamilton, Inc., New York.*

# Unattended Sites Get Data Logger

NEWTON, Mass. — Memodyne Corp. has a data logging system for remote unattended operations that stores 1.5 million bits on a Philips cassette with 12-bit resolution.

The Model 3243 is capable of handling up to 16 analog input channels with periodic real-time indexing, auxiliary header inputs and calibration information, the firm said.

The system includes power supplies, front panel controls, rear input/output connectors and displays for monitoring time and digital inputs.

It also has selectable scan rates of 2-, 5-, 10-, 20- and 50 sec and 1-, 2-, 5-, 10-, 20- and 50 min. The logger costs $2,895 from Memodyne at 385 Elliot St., Newton, Mass. 02164.

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|---|---|---|---|---|---|
| | | FOX-1100 | 520 | ADM-3 | VT-52 |
| Easy-to-Read Display | 9 X 12 Matrix for highly legible characters | Yes | No | No | No |
| | Black on white or white on black display. | Yes | No | No | No |
| | Display at eye level | Yes | No | No | No |
| | Display set deep in hood to reduce glare | Yes | No | No | Yes |
| | Full 24 X 80 display | Yes | Yes | Option | Yes |
| | Full 96 character set, upper and lower case | Yes | No | Option | Yes |
| | Easy-to-find block cursor | Yes | No | Option | No |
| Ability to Enter Data Anywhere on Screen | Complete cursor addressing and control | Yes | Yes | Option | Yes |
| High Operator Throughput | Tab stops that can be set to any column | Yes | No | No | No |
| | Tab key | Yes | No | No | Yes |
| Low Operator Fatigue | Backtab key | Yes | No | No | No |
| | Shiftlock key | Yes | No | No | No |
| | Typamatic repeat on all keys | Yes | No | No | No |
| | Separate print key | Yes | Yes | No | No |
| | Backspace key | Yes | Yes | No | Yes |
| Convenient Switching Local/On Line | Local-remote mode key | Yes | Yes | No | No |
| Simplified Interfacing to Printer | Fully buffered port to make printer speed independent of CRT speed | Yes | No | No | No |
| Easily Accessible Mode Controls | New line enable key | Yes | No | No | No |
| | Autoline feed key | Yes | Yes | No | No |
| | Scroll enable key | Yes | Yes | No | Yes |
| High Speed Numeric Input | Integral numeric pad | Option | No | Option | Yes |
| Simplified Program Debugging | Transparent mode and displayable control characters | Yes | No | No | No |
| Cost Effectiveness | OEM price in quantities of 25 for basic unit with 24 X 80 display | $971 | $1195 | $1080 | $1476 |

*In quantities of 25.

# Hospital Makes 'Smart' Move Toward Cardless Shop

**By John P. Hebert**
Of the CW Staff

NORFOLK, Va. — A medium-sized hospital here has achieved its goals of increased productivity and improved keying accuracy while lowering data entry costs by replacing its keypunch equipment with an intelligent terminal system.

According to data entry statistics compiled over the last six months by David Hilton, De Paul Hospital's DP director, data entry productivity has increased between 30% and 40% and savings total over $1,200/mo.

Two years ago, keypunch operators were having a hard time meeting the keypunching demands caused by an increasing number of patients. The alternatives to its two-shift keypunch operation were adding another shift or hiring more operators and getting more equipment, Hilton explained.

Hilton decided it was better to hire more people to operate De Paul's three IBM 129 keypunches on a third shift, but the attempt was unsuccessful.

### Start of the Switch

De Paul once had bad keypunch bottlenecks from growing emergency room admissions, Hilton recalled, adding the outpatient admissions data was the last to be keypunched.

To solve that problem, the 400-bed hospital installed two intelligent terminals more than a year ago. The terminals capture data at the source and edit it for entry into De Paul's IBM 370/115 [CW, May 17, 1976].

It was then, Hilton said, that he got the idea of replacing the keypunches with intelligent terminals for input of all admissions information.

After looking into key-to-disk data entry systems including a Computer Machinery Corp. Model 7, Four/Phase Systems, Inc. equipment, Sycor, Inc. 340s and 350s and IBM 3740s, Hilton decided to use a Sycor 340B with an IBM 3740-1.

"Then I became aware of the Sycor 440. I cancelled the order for the 340B and the 3740-1 and ordered a 440. Sycor doesn't have a data entry operating system, but it was an inexpensive approach to solving our problem," Hilton said.

The hospital has saved about $2,000/mo since last summer in equipment, personnel and punched card costs by removing the three keypunches, an IBM 083 card sorter and an IBM 1442 card reader and returning to a two-shift operation.

### Monthly Savings

The intelligent terminal system and maintenance costs De Paul about $750 each month, so it is saving a total of about $1,200/mo, he said.

In addition, an IBM 2501 card reader used for job control will be eliminated in the near future, he said, adding the DP department will need a central way of reading job control before it can be removed.

The intelligent terminal system consists of a 56K CPU, a 5.3M-byte disk, a Sycor 3484 printer, one Wang Laboratories, Inc. 800 bit/in. tape drive and three Sycor 440 CRT/keyboard terminals for data entry, Hilton said.

### Primary Benefit

Although the cost savings are certainly an advantage gained from the equipment shuffle, Hilton said the primary benefit has been the increased throughput and accuracy of data stored for subsequent processing on the 370/115.

The DP department validates, edits and otherwise controls input data at the source because the intelligent terminals' flexibility allows the staff to program the functions it desires, the DP director explained.

Many of the benefits are a result of what Hilton and his staff did with the system. Sycor "designed the machine to be flexible, but we programmed it to our specifications," he said.

Hilton is also pleased that De Paul has made advances in its quest for a card-free environment "because of the high cost of punched cards and 'antiquated' card formats."

When he studied the former keypunch operation, Hilton found 11 different IBM 129 program cards were required in one application. "And the 1442 was a white elephant because it was used as a computer card output device," he added.

When the intelligent terminal system arrived, Hilton told his staff to forget about the card layouts for the 370 and concentrate on the data entry requirements for the admissions application.

"I assigned a keypunch operator and a programmer full-time and told them to design the system around the source document with a complete disregard for the 370," he recalled.

### Batch Called Adequate

The 440s hold a 256-byte record on tape for every transaction; all patient admission information is now on tape or disk. A program in the mainframe converts the 440 transactions to prepare them for processing, Hilton said.

The terminal files are retained in batches. Once a week the DP staff updates the 440 files on the 370, he said, noting the batch mode is adequate.

Sometime in the future, De Paul may connect the terminals on-line to the mainframe to facilitate data entry and utilize the 440 for off-line display and processing as well as to communicate with the hospital's other computers, which are used for laboratory and other applications.

The 370 processes the hospital's accounts receivable, inpatient and outpatient data and payroll for the 1,300 employees. It also provides a preventive maintenance schedule for hospital equipment, an inventory for the purchasing department and dinner menus.

# RO Printer Includes Hytype Daisy Wheel

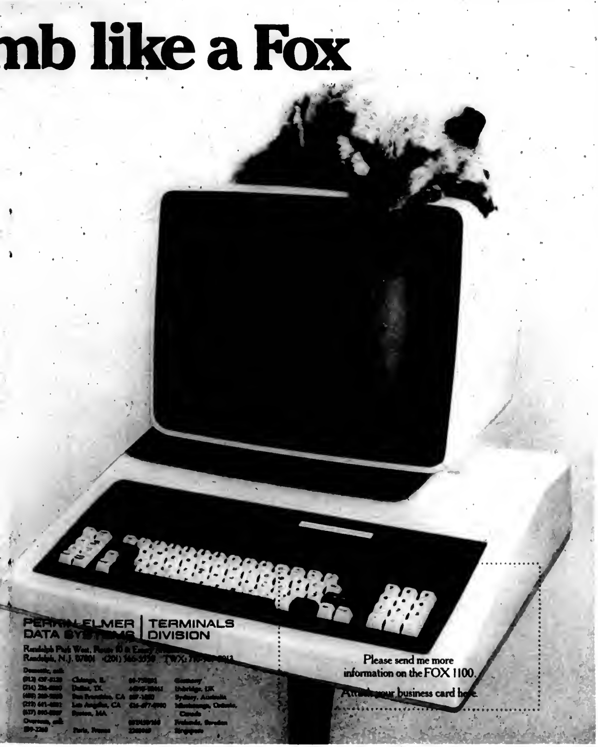
CAMPBELL, Calif. — Data Terminals & Communications (DTC) has a receive-only (RO) printer that uses a microprocessor-controlled Diablo Hytype-II daisy wheel print mechanism, according to the firm.

The DTC-302RO can be used in either serial or parallel mode and is rated at speeds from 110- to 450 bit/sec.

The electronics package and power supply are housed within the printer case. Plotting and pitch selection are standard features, the company said.

Options for the printer include over 20 different type fonts, pin-feed platens, forms tractors, mobile pedestal and a variety of ribbon cartridges, according to DTC.

The unit costs $2,980 from the firm at 1190 Dell Ave., Campbell, Calif. 95008.



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## Mini Bits

### SI Cuts Prices of Disks For DEC, DG Machines

SUNNYVALE, Calif. — System Industries (SI) has cut prices by about 15% for its 80M-byte and 300M-byte disk, systems compatible with Digital Equipment Corp. and Data General Corp. minicomputers.

The 80M-byte drive was reduced from "just under $20,000 to under $17,000," a spokesman said, while the 300M-byte drive was cut from about $29,500 to about $24,800.

SI is located at 535 Del Rey Ave., Sunnyvale, Calif. 94086.

### IBM 3 Users Plan Exhibit

WALTHAM, Mass. — The New England System 3 users group is sponsoring an exhibition prior to its meeting here Wednesday.

The exhibition will feature products from 25 vendors including hardware and software products. It will be open from 9:30 a.m. to 6 p.m.; there is no admission charge, a spokesman noted.

After the show, the IBM users group will have its monthly meeting. The show will be held at the Hillcrest Restaurant; 220 Bear Hill Road, Waltham, Mass.

### Monolithic Introduces Add-Ons

ENGLEWOOD, Colo. — Monolithic Systems Corp. has two memories for Digital Equipment Corp. PDP-11/04 and PDP-11/34 users which can be expanded to 16K words in 4K-word increments and to 64K words in 16K-word increments.

Both add-on memories are available with or without parity and fit into a single memory slot, the firm said.

Designed around 16-pin memory elements, the memories can be ordered in minimum configurations and expanded later to meet increased memory requirements.

Both the 16K-word MSC 3501 and the 64K-word MSC 3603 are completely hardware- and software-compatible with the PDP-11/04 and 11/34, the company claimed. In addition, high-speed versions of both memories are available, Monolithic said.

The MSC 3501 costs $1,495 while the MSC 3603 is priced at $5,395. Monolithic is at 14 Inverness Drive E., Englewood, Colo. 80110.

### Sorbus Offering GRI Upkeep

KING OF PRUSSIA, Pa. — Sorbus, Inc. is now maintaining GRI Computer Corp. small business systems. Sorbus can be reached at 150 Allendale Road, King of Prussia, Pa. 19406.

### *To Tie Applications Together*

# Dental School Caps DP Search With Mini

**By Esther Surden**
Of the CW Staff

BOSTON — Minicomputers customized by the user to its own application have solved the problem of finding the right hardware for the job here at Tufts University School of Dental Medicine.

The mandate was given to several researchers to research, design and implement a computer-based information system at the dental school, which previously had no computer itself and relied on the Medford, Mass., main campus' Digital Equipment Corp. Decsystem-10 mainframe.

"Our research revealed that the alternatives of hardware selection were vast; we really didn't know where to start," Michael Resnicow, systems analyst at the school, admitted. And technology was changing so rapidly that it was difficult for the team to stay on top of the newest advances.

The primary application would be data entry into the mainframe. "We were faced with performing a data entry application for registration information, which typically could be gang-punched or otherwise batched, or registering the patients at the rate they come in," Resnicow said.

#### 'Tremendous Volume'

Recording patient treatments as they are given each day "creates a tremendous volume of transactions which could either be batched or we could go to source data entry at the time the transactions occur," he added.

"Another problem was how to gather the information for the financial system. Presently we have a manual accounting system, but an automated accounting system would enable us to do automatic billing, receivables and maintenance.

"We'd like to have some kind of electronic device at the register that could record transactions, maintaining and updating accounts dynamically. This could be on-line, gang-keypunched or off-line," he said.

Since the financial system was not the primary concern, the establishment of an information system with a data base of patients and students and monitoring student participation became a priority. The researchers then asked, "Do we want to batch the data, have it keypunched at Medford at the keypunch operation or do we want to do something in-house?"

In the last five years, Resnicow said, "it has become somewhat in vogue to consider the alternative of off-line entry, which is somewhere in between the keypunching and on-line."

The determination was made that the mainframe couldn't handle a complete on-line system, so the school began to investigate the off-line alternatives. Judging "the off-line devices was where we started getting swamped," Resnicow stated.

Available were off-line intelligent terminals that could record data at the source of transaction and distributed systems that would allow the school to hang several terminals off one processor so they could then "talk to" the Decsystem-10.

#### 'Astonishing Discoveries'

Later, the financial application became a high-priority item. "We then found ourselves investigating cash registers and that's where we made our most astonishing discoveries," Resnicow said.

*"How should the system be optimally designed?" and "Is there equipment around that can do the job?" are questions facing almost any application designer.*

*Trying on different equipment for size may not be feasible under normal economic conditions. Although technologies are merging so it's difficult to tell the difference between such things as minicomputers, intelligent terminals and even cash registers, the perfect piece of gear for an application could be elusive.*

Not familiar with the area of point of sale, about a year ago Resnicow was surprised to find that "first of all they don't make mechanical registers anymore" and, secondly, that many typically analog devices are not only moving away from analog-to-digital, but that applications are converging.

The researchers started interviewing makers of electronic registers, looking for people who could supply a machine that could "not only generate a receipt, but could do source data entry because if you are going to enter the data into a machine, you might as well remember the transaction and update the patient accounts."

The classic approach used now involves a cash register and a separate entry routine, but "we wanted to do it all in one swoop," he said.

"We also wanted registers that could be compatible with our information system, somehow transmitting data to the Decsystem-10," he continued.

After calling the various makers of such registers, the researchers became frustrated. At that time — a year or so ago — there was no register that would fit their requirements. They were told the technology was on its way, he said, and this has proved to be so, but then they went back to the drawing board to investigate other alternatives.

Minicomputers seemed the logical approach for all the other applications, so Tufts began talking to various vendors.

*(Continued on Page 48)*

# Tandem Expands Nonstop System With Intelligent Controller, Disk

CUPERTINO, Calif. — Tandem Computers, Inc. has enhanced the processing power of its Nonstop system with the introduction of an intelligent microprocessor-based disk controller and 200M-byte IBM 3330-type disk drive.

With the T16/3103 dual-port disk controller, up to eight of the drives can be linked to the Tandem system. The controller features a 4K-byte block buffer which is said to improve processing efficiency by reducing interprocessor data transfer and I/O channel transmission.

The controller also has a read-without-transfer capability that allows users to copy data onto mirror volumes or separate disk drives without using an I/O channel, the firm said.

Designed for uninterrupted operation, the Tandem system previously transmitted data for storage from the primary processor to its backup processor before transmitting to disk. This step has been eliminated with the addition of the T16/3103, a spokesman explained.

Now the primary processor sends a checkpoint to its backup when the controller has accepted a data block and then transfers data from the controller to the disk units. If the processor fails before signaling completion of the operation, the backup processor can retry the operation because the block still resides in the controller, Tandem said.

The backup processor can access the data base through the controller's dual port, the spokesman noted.

The controller also performs error correction in its buffer on data reads from disks before data is transferred to the channel or another disk volume, he added.

#### Adaptable Controller

Because it uses programmable read-only memory (Prom), the controller can be adapted in the future to new technology by only changing a Prom chip, the company claimed.

The T16/4103 disk drive is a 200M-byte unit that uses IBM 3330-II type technology. It has an 806 kbyte/sec data transfer rate with a 30 msec average access time and an 8.3 msec average latency. The two-ported drive can be attached to two disk controllers simultaneously, Tandem said.

The controller costs $10,500 while the disk drive costs $24,500, the spokesman said from Tandem at 20605 Valley Green Drive, Cupertino, Calif. 95014.

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## *Service Bureau Too Slow*

# Company Finds In-House System Good Headache Relief

**By Esther Surden**
Of the CW Staff

NEW YORK — Headaches are what a firm here said it got from its service bureau along with late payroll checks — so it went to a small, in-house business system.

Loi Industries, headquartered in the Bronx Terminal Market, is the parent company of nine subsidiary corporations. It had been using Burroughs Corp. bookkeeping machines as well as a service bureau to do its payroll before it went to the in-house system.

Before it installed that system, it sometimes had to keep a shift overtime so the paychecks could be distributed, controller Fred Lauber recalled.

With the service bureau problems as an incentive, reinforced by a need to straighten out a burgeoning company that had outgrown manual ways of doing things, Loi began looking at small business systems. The company considered systems from Philips, NCR Corp., Litton and IBM, but dismissed them for various reasons. For example, the IBM system didn't print clear copies, Lauber said.

### Good Service

Loi settled on a Burroughs B700 because "we had had good service before on Burroughs machines and this looked like it was simple to operate," Lauber said.

All but one of the firm's subsidiaries are on the system now. Some of the subsidiaries market five produce products ranging from bananas to potatoes on both the wholesale and retail levels; others include a service station and a trucking company.

"Actually, we are dealing with three different types of business," Lauber noted. About 60% of the sales volume is in cash sales and there are "lots of tickets because people buy in small amounts."

Loi purchased Burroughs' standard business program module with its system. Some of the programs needed major modification to be adapted to the produce business, Lauber said.

For example, the produce business needs weekly aging as opposed to the monthly aging, which is adequate for most businesses. Burroughs took its established package and modified it without charge for the company, Lauber said.

"Previously we couldn't get aging schedules," he said. "The system has speeded up our collections considerably. It has also cut down on the time it takes to do the billing."

Formerly, he explained, billing was performed at the different branches; now it is done at the central office without the personnel costs associated with having to have someone at each branch to perform this function.

Inventory control is also on the system, he added, something "we never had any idea of before." The system provides reorder points as well as total sales in a day, sales by routes and by stores.

### In-house Payroll

"And, of course, the payroll is now in-house, so the checks get out on time.

"We figured to do all this work [manually] we would have had to hire three more clerks. The system should pay for itself in three or four years," he said.

The $60,000 system includes a CPU with console printer, disk, line printer and auxiliary data entry unit. Loi may expand to another data entry unit later on.

Maintenance for the system is "excellent," Lauber said.

The service office screens all calls and gets to the emergencies quickly so "the longest we've had to wait is four working hours," be added.

---

# *Talos Links PDP-11 With Its Digitizer*

SCOTTSDALE, Ariz. — Talos Systems, Inc. has an interface to couple its Series 600 digitizer to a Digital Equipment Corp. PDP-11 minicomputer.

Users can choose either quad sequential interfacing, which goes to the DEC DR-11C, or RS-232 interfacing, which links with the DEC DL-11D, the firm noted.

The quad sequential version costs $300 and the RS-232 version costs $450. Talos is at 7419 E. Helm Drive, Scottsdale, Ariz. 85260.

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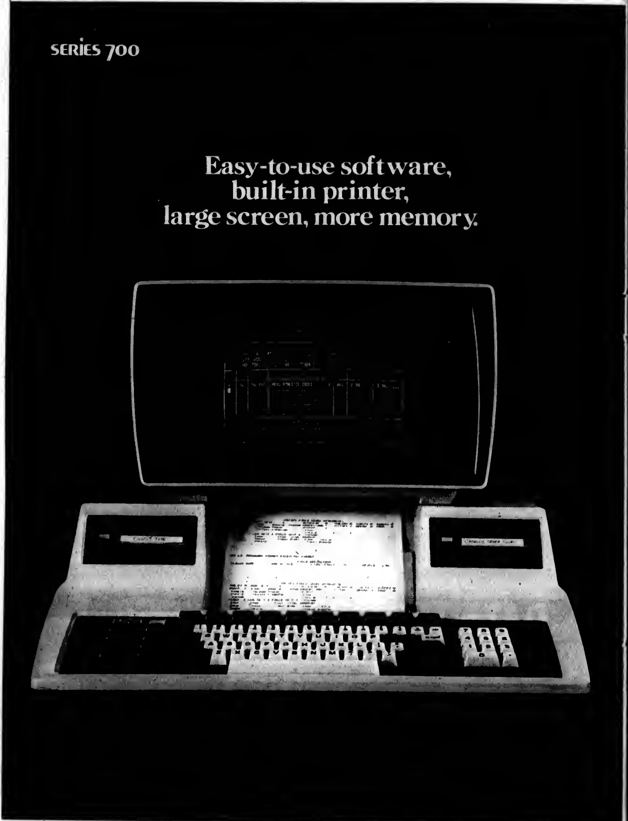

# Users Found Not Studying Cost Before Going In-House

**By Esther Surden**
Of the CW Staff

MENLO PARK, Calif. — Although users generally cite cost as one of the reasons for switching from a service processing organization to an in-house system, "users do not usually perform a detailed cost comparison prior to purchasing a small business system," according to Input, a market research organization here.

Input defined service processing organizations as service bureaus, time-sharing organizations and remote batch and inquiry services.

When calculating costs, users usually evaluate only the monthly processing charges vs. the monthly hardware and maintenance costs for an in-house system, Input found after surveying 35 users who have switched from a service processing organization to an in-house system.

"Personnel costs are usually absent from the calculation because system 'operators' are considered . . . system 'users' and additional tasks are being performed without a personnel increase," the firm said in a report on the results of the survey.

Users also do not consider software costs in their calculations, the researchers said.

When users say they want more control over their business they usually are dissatisfied with "the service vendor's responsiveness to requests for software modifications, format flexibility and processing turnaround time," according to the study.

When the system is installed, however, most users are not interested in packaged software; they want packages designed or modified to their business peculiarities, the survey found.

Many users contract with their services vendor or a third-party software company, learn all they need to know at the vendor's programming school and thereafter perform program development, modification and maintenance themselves, the report continued.

This is especially true of users who have switched from some kind of remote computing service such as time-sharing or a data base inquiry service.

Users "expressed no prejudice against processing services vendors as small business computer suppliers as long as service was acceptable." When the service vendors supplied the in-house system, users felt there was better coordination during the transition stages, Input said.

The average hardware system costs $50,000 to $55,000 and at least 95% of the surveyed installations either bought their systems outright or contracted for a full payout lease, the report added.

The full report is available for $2,500 from Input at Suite 320, 2180 Sand Hill Road, Menlo Park, Calif. 94025.

# EMM Ruggedizes DEC-Type Mini

LOS ANGELES — The Secs-111 minicomputer from Electronic Memories and Magnetics Corp. (EMM) is a rugged minicomputer that "emulates all functions of the Digital Equipment Corp. PDP-11/34 and 11/35."

The system can be used in severe climate areas and in such industries as oil drilling, EMM said.

The mini is a self-contained module that consists of four multilayer board logic modules, power supply chassis and control panel. The CPU is mounted on two hoards with an I/O bus and an optional 1K word of semiconductor random-access memory (RAM) mounted on the other two boards.

### Additional Space

Additional board space is provided for up to 128K of RAM, 32K of programmable read-only memory (Prom) and custom I/O devices, the company said.

The Secs-111, which will be available in September, costs $13,000 in a basic configuration of the CPU with 16K words of semiconductor memory, chassis and 4K of Prom from EMM's Severe Environment Products Division, 20630 Plummer St., Chatsworth, Calif. 91311.

# Dresser Binders Hold Floppies, Hard Copy

WARWICK, R.I. — Dresser Products, Inc. has introduced the Mag-File file folder which holds a floppy disk or diskette with its associated hard copy.

The Mag-File is available in two styles, one for standard drawer filing and the other for filing in loose-leaf binders.

The price for the drawer-filing folders is $24 per 100; the loose-leaf binder folders cost $22.50 per 100. The binder costs $25 from Dresser at P.O. Box DP, Warwick, R.I. 02888.

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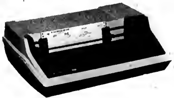

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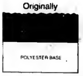

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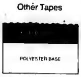

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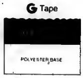

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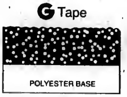

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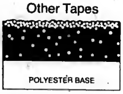

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# S&L Finds Mini Eases Workload Associated With Mortgage Loans

FREMONT, Neb. — Equitable Federal Savings and Loan Association here has eased its mortgage management workload with a small business system and packaged software, according to Gary Spurrier, vice-president.

The system, located in the Mortgage Loan Department, has also "saved hiring at least two people in the home office and others in our branch office," Spurrier added.

Processing about 1,500 loans per year through the home office and five branch offices, the association needed to do something because "our workload had increased to the point where personnel in our branch offices would have had to have been recruited to process mortgage forms," he explained.

"When one considers the cost of the $10,000 per year for salary, desk and equipment, along with fringe benefits and office space per secretary to perform the processing by hand, our $27,000 investment in the small business computer and mortgage management programs will pay for itself within two years," he stated.

The savings and loan (S&L) is using a Wang WCS-20 minicomputer which runs Wang's Mortgage Management System software. The S&L considered the IBM 5100 before choosing the Wang primarily because of its software program for S&Ls.

"IBM did not have an S&L program for the 5100 at that time," Spurrier said.

### Customized Operation

"We deal mainly with conventional loans, but we have the capability of handling any type of loan," loan clerk Nancy Hansen said. "During the course of my work, I generate 40 different forms, all of which are customized to Equitable's operation.

"Before we obtained the Wang system, all loan calculations were performed manually by several people and all forms had to be typed by hand. This occasionally led to inaccuracies, errors and general inefficiency," she recalled.

The software package was designed so anyone can easily create his own typed format and responses, she noted.

### In-House Control

"Probably the best feature of our system," Hansen explained, "is that it provides us with complete in-house control. There are often changes in reports and forms which are necessitated either by our own management or by new federal regulation requirements. We can now make these changes in a matter of hours without having to deal with an outside programming consultant."

With this added "self-customization" flexibility, Equitable Federal not only saves time and consulting fees, but offers rapid service to its customers while keeping pace with latest innovations.

Access to records is immediate and storage of information is compact using the flexible disks, which are an integral part of the minicomputer, she said.

When asked about additional uses of the system, Spurrier noted Hansen "has also programmed form letters for us and the president's report, which is sent to officers and directors. This report includes a printout of all loans closed for the month, by individual branch."

# Dental School Caps DP Search With Mini

*(Continued from Page 43)*

"We discovered tremendous capabilities in them all, but the prices were wide-ranging. A system that was fully programmable, could do all our data entry and could talk to our big machine ranged in price from $4,000 to $13,000," Resnicow recalled.

The school decided to lease a Wang Laboratories, Inc. system because "we don't buy machinery because we know it can become outdated."

The systems at the school now include a PCS-I system and a Wang 2200. The systems are performing all of the applications except the financial ones and are communicating to the host in Medford.

### One System Does All

After the installation of the minicomputer system, the analyst realized that it could be the answer to the financial application problem as well. In the future, the school may hook the Wang systems up to a cash drawer so all the applications converge on one system.

"We didn't buy a keypunch or simply a minicomputer or even a cash register — we bought one system that can do it all. It even has a forms language for data entry and performs data verification," Resnicow said.

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CIRCULATION DEPARTMENT

# Sharp Bases Business Mini on Calculator

PARAMUS, N.J. — A desktop small business system based on a programmable calculator has been introduced by Sharp Electronics Corp.

Dubbed the 2700 Servant, the system is available in four versions, the 2701, 2705, 2710 and 2715.

The 2701 includes the calculator, dual floppy disk drives, 10K of memory, a 16-character display to check numerical entries, magnetic card station, 30 char./sec printer and a keyboard with both alphanumeric and scientific function keys.

The 2705 has a Digital Equipment Corp. LA36 keyboard send/receive teleprinter in addition to the 2701's features.

The 2710 uses a 45 char./sec matrix printer, while the 2715 has a 30 char./sec impact printer that can print up to 12 copies. The system can handle ledger cards and stock certificates, Sharp said.

In the range of offerings from such firms as Monroe and Tealtronics, Inc., the system is user-programmable in Basic, according to a spokesman. A general ledger program is provided with the system for invoicing, accounts payable and other general business needs, he added.

### Industry-Oriented

Available "sometime this spring," the system will be sold through dealers who will also develop industry-oriented software, the spokesman stated. Service will be handled through an independent maintenance supplier or the dealer.

The 2701 costs $8,765; the 2705 and 2710 are priced at $10,500 each; and the 2715 costs $13,000. Sharp is at 2 Keystone Place, Paramus, N.J. 07652.

# Datum Delta III Replaces DEC DC-II

ANAHEIM, Calif. — Datum, Inc.'s Delta 111 cassette I/O system was designed for Digital Equipment Corp. PDP-11 users.

The system is a replacement for the DEC PC-11 high-speed paper tape punch and reader and is compatible with existing DEC software, Datum claimed.

The Delta 111, which Datum said has nine times the transfer speed of the DEC system, can store about 300K bytes. It features bidirectional searching and rewind and has ready status, tape rewinding, beginning-of-tape, end-of-tape and on-line status registers, the firm said.

The maximum data transfer rate for the unit is 2,600 byte/sec.

The unit costs $3,650, Datum said from 1363 State College Blvd., Anaheim, Calif. 92806.

# Randal Adds Two to Offerings

TORRANCE, Calif. — Two small business systems have been added to Randal Data Systems, Inc.'s repertoire with the introduction of the Link 102 and the Link 206.

The basic Link 102 system, which uses 630K bytes of floppy disk for auxiliary storage, can accommodate 32K to 64K bytes of memory and uses a 30 char./sec printing console. The system can handle three additional diskette units to expand storage to 2.4M bytes, Randal said.

Randal Link 102

The Link 206 system was designed for applications that need quality printing and graphics capability, Randal said. It features the ability to store up to 40M bytes of auxiliary disk storage and 64K-bytes of solid-state memory.

Up to 16 ports can be used for multiterminal time-sharing applications, a spokesman added.

Both systems are programmed in Business Basic and function under the Randal Time-Sharing Operating System. They are program-compatible with other members of the Link family, the company noted.

Application programs for the systems are available through distributors.

The basic Link 102 costs $12,750. A basic Link 206 with 32K bytes of storage, 10M characters of disk and a 960-character CRT costs $24,500. Randal is at 365 Maple Ave., Torrance, Calif. 90503.

# Desktop Unit Files, Analyzes Sale Data

DETROIT — Burroughs Corp.'s preprogrammed C 6413 analysis and distribution system is a desktop unit that enables the user to distribute data from raw media such as invoices, time tickets and sales slips into as many as 90 categories, the vendor said.

The programs provide distribution of quantity and value; dual distribution of sales by product and by salesman simultaneously; and distribution by the user's assigned code numbers, according to a spokesman.

The system allows small businesses and branch offices of larger organizations to determine sales by product, by sales representative or by department; sales by both product and sales representative; and analysis of costs by department and by job, he added.

### Analysis Routines

The analysis routines are initiated through the use of labeled program keys. To activate a routine, the operator selects the type of analysis required by selecting the appropriate key and then indexes the amounts. The results of the analysis are then printed, the firm said.

The C 6413 includes a display which provides visibility of all data input and allows for checking and correction before printing on tape; a printed audit tape listing all entries and totals; optional proof of analysis document by document; and optional reference numbers for each document or entry, Burroughs said.

The C 6413 costs $1,495 from Burroughs World Headquarters, Detroit, Mich. 48232.

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## CI Notes

### *Casualty Firm Acquires Large Block of CA Stock*

IRVINE, Calif. — Great American Insurance Co., a subsidiary of American Financial Corp. of Cincinnati, has acquired over 200,000 shares of Computer Automation, Inc. (CA) stock, representing approximately 14% of the outstanding shares. This acquisition made Great American the single largest shareholder.

David H. Methvin, CA president, holds about 160,000 shares, according to a CA spokesman.

A spokeswoman for American Financial said the firm invested in CA because it had $600 million that needed to be invested and the firm has a philosophy of making large investments in a few companies rather than investing in many firms on a smaller scale.

A CA statement said Methvin was pleased American Financial had chosen to add CA to its stock portfolio. Asked if CA was planning any counterstrategy, Methvin replied "Defense? Against what?"

### Inforex to Appeal Ruling

BURLINGTON, Mass. — A state appeals court's revision of a lower court decision could result in a "substantial material adverse effect" on Inforex, Inc.'s earnings, according to the firm.

Possible damages could amount to $1.4 million, Inforex estimated, resulting in a charge of 20 cents a share against second-quarter earnings.

The suit, brought in 1971 by James Steranko, a former Inforex vice-president, alleged he was "improperly terminated" and sought the release of 26,000 restricted shares of Inforex stock.

A 1975 decision awarded Steranko the shares and $3,500 in damages, but an appeal was filed asking for additional damages amounting to the difference in the shares' worth in 1972 when he originally asked for the release and their value in 1974 when the case went to trial.

Inforex is seeking a reversal in the appeals courts and will appeal to the state's supreme court, according to the firm.

### Correction

Information Technology, Inc. of Philadelphia has been acquired by Ketron, Inc. [CW, May 9]. Information Technology, Inc. of Newton, Mass., is not involved in the transaction in any way.

## *Cobol on Minis — Part 3*

# Business Demands Cobol on Large Minis

**By Molly Upton**
Of the CW Staff

Makers of large-scale minicomputers are riding the wave of demand for Cobol. Although several cited different motivations, nearly all agreed one "cannot get in the [business DP] door" without it.

But the underlying generator of the wave is probably the availability of Cobol programmers and the language's increasing usage even in markets that traditionally ignored Cobol.

A few firms have had Cobol for several years. Some of the latecomers include Interdata, Inc., whose special impetus for offering Cobol was the order from Citibank for a number of systems, and Systems Engineering Laboratories, Inc. (SEL), which plans to offer Cobol in about a year.

Some vendors, like Interdata, cited the attraction of the business DP market as the motivation for offering Cobol, while SEL has noticed its established markets are showing an increased demand for Cobol.

SEL plans to offer Cobol on its larger machines, the 32/75 and 32/55, in about a year, according to Mike MacFarlane, marketing software product manager. The firm has not decided on what other machines the Cobol will be offered. An outside firm is writing the compiler, he said.

### Programmer 'Transportability'

MacFarlane explained one key reason for the increased demand for Cobol even in markets that formerly didn't mention Cobol is the "transportability" of Cobol programmers.

"There's a prevalence of Cobol programmers out there. It may not be the world's most wonderful language, but a lot of people use it and it is commonly accepted," he remarked.

"Instead of changing markets — although we expect it will help us be able to move into new ones — our current markets are beginning to demand Cobol," he stated.

Hewlett-Packard Co. put Cobol on its HP 3000 in 1974 after it found the major market for the machine was the business DP arena, according to Jerry Peterson, product marketing manager for the 3000.

"Initially we saw the biggest part of that market being small to medium-size companies who were going to upgrade from an [IBM] 3, for example. Those people were expecting to see either RPG or, in some cases, Cobol on the machine," he stated.

But back in 1974 HP started working with very large companies who were looking at distributed DP. HP found "there was no way to even 'get in the door' in business DP without some sort of Cobol capability because that's what they were used to working with on their big mainframes.

"That decision has stood us very well, because distributed DP has really gotten red hot in the last year or so. Without having a good Cobol on the machine, you're dead in the water in the distributed DP marketplace," Peterson commented.

He estimated at least 50% of 3000 users have Cobol and a larger percentage have some sort of commercial language. RPG is also available on the 3000-II.

HP recommends 192K bytes on the 3000-II system with Cobol, which has a large symbol table capability so it can handle large programs, Peterson said.

HP's Cobol compiler is a fully implemented version of Ansi '68 except for the report writer. HP sells the compiler for $4,500.

### 'An Industry Standard'

Interdata offers Cobol on its 7/32 and 8/32 systems as part of its thrust into the business DP arena, according to Robin Gillett, product line manager for software.

"Cobol is such an industry standard that

*(Continued on Page 52)*

# GSA Sets Date for TSP Start-Up

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — Information services vendors and federal agencies can stop waiting with bated breath. The General Services Administration (GSA) has declared Aug. 1 the date on which its Teleprocessing Services Program (TSP) becomes mandatory.

In a parallel announcement, a GSA spokesman said the agency will not extend its National Teleprocessing Services contract with Computer Science Corp.'s Infonet beyond its present expiration date of Sept. 30. Infonet has been the federal government's primary source of teleprocessing services since 1972.

TSP requires that after Aug. 1 all federal agencies contract for interactive and remote batch teleprocessing services from firms preapproved by GSA or through a competitive or "basic agreement" procedure established by the program, the spokesman explained.

The services industry and government agencies have been waiting since the beginning of the year for an announcement from GSA on the mandatory start-up date of the program.

A hint that the agency was close to setting the date came late last month when it gave the Department of Housing and Urban Development (HUD) the go-ahead to acquire teleprocessing services under TSP.

HUD plans to develop a mortgage insurance accounting system and will select a TSP contractor from the schedule of firms approved by GSA as soon as possible.

Under the guidelines and regulations of the TSP, federal agencies must conduct benchmarks of scheduled contractors if the costs of required systems exceed certain limits established by GSA.

Accordingly, HUD contracted in late April with Real Decisions Corp., a consulting company, for a benchmark package for use in choosing a remote computer services vendor for its mortgage insurance accounting system, according to John M. Lewis, president of the firm.

Real Decisions was given three weeks to supply the package on a system already designed but yet to be developed, Lewis stated. GSA told him TSP would become mandatory before HUD used the benchmark programs created by Real Decisions.

HUD will be obligated under the TSP to select the technically qualified teleprocessing vendor who comes out on top in the benchmarking procedure, Lewis said. That vendor will be given the job of developing the programming for the system.

Vendors already on the TSP schedule are aware of HUD's system and consider it "a very large procurement," Lewis noted. The total TSP is estimated by GSA to be worth in the neighborhood of $60 million to those firms on the schedule.

To date, eight companies have made their way onto that schedule. They include Rapidata, Comnet, First Data Corp., Computer Sciences Corp., United Computer Services, Informatics, General Electric's Information Services Division and Information Consultants, Inc.

GSA had hoped to have between 12 and 15 firms on the schedule before it announced the mandatory date for the program to begin, according to the spokesman. The agency expects to approve many more companies for the TSP before Aug. 1.

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# Makers of Minis Say Business Users Demanding Cobol

*(Continued from Page 51)*

one can't get in the business processing door without it," he said.

In Interdata's case, the impetus for offering Cobol was the order from Citibank, he said. The Cobol was developed by a systems house that is an OEM customer of Interdata's, Diversified Data Systems, Inc., in Tucson, Ariz.

After arranging to acquire the Cobol, Interdata has "spent a fair amount of time and money embellishing it" and making it a more general-purpose language, Gillett said. The firm just released its second revision, and there will be more, he noted.

Essentially the version is a superset of Level 1, 1968 Ansi, but it falls short of other Cobol compilers in terms of language features, he said. For instance, it does not have either a COMPUTE or a SORT verb, he said.

The compiler takes about 45K and the minimum realistic system is about 128K, he said, unless someone writes a smaller operating system.

Interdata recently released an indexed sequential access method (Isam) package that is provided along with the Cobol compiler. A sort/merge package and a runtime library are also part of the $7,000 license fee for the first copy of the compiler.

### 'Demanded Item'

Digital Equipment Corp. has offered Cobol on its PDP-11 series for about a year and a half or two years, according to Robert Thaler, product manager for Cobol in the Commercial Products Group.

Cobol has been available on the Decsystem-10 since its inception, he added.

Cobol "is a demanded item. In the commercial marketplace, it's pretty much the spoken or unspoken standard," he explained.

DEC's Cobol for the PDP-11/35 through PDP-11/70 is based on the Ansi '74 standard. About 80% of the standard is implemented, he said.

Cobol is available for a separate price and the minimum realistic system is about 160K to 192K bytes with the Commercial Transaction System (CTS) 500 operating system. The minimum for the operating system is 128K bytes.

The CTS 500 includes RSTS/E and a Basic Plus interpreter as well as the Data Management Services 500, he said.

### Prerequisite, Not Plus

Prime Computer, Inc. instituted Cobol on its machines models 300 and up last September and has found users are expecting to find Cobol available, according to Joe D'Angelo, director of planning.

The majority of users have Cobol as a prerequisite, he said, whereas a year and a half ago, they viewed Cobol as a plus.

"Now people are taking very large-scale kinds of functionalities and looking for them on mini equipment. When they do that, they expect a certain set of software, and Cobol is certainly in that set every time," he said.

"One of our strategies is to offer a very sophisticated set of tools to people who know how to design applications best and people who have a lot of applications use Cobol.

"Many of them have a ton of application programs written in Cobol and want to move them to another system," he said.

"Prime has a series of interactive business data processing systems which include a data base management system that is Codasyl-compliant, and all those things say Cobol," he added.

Prime recommends having 128K bytes or above, he noted.

Prime's Cobol is Ansi '74, Level 1 plus, he said. "If you weight it by the features people use, it is 1.6, but overall about 1.1," he said.

The license fee for Prime's Cobol is $5,000, which includes one year of software update service.

Varian Data Machines finds Cobol is in very high demand, according to Ernie Ohrenstein, director of product management.

The firm offers Cobol on its V77 family, which includes the V77-400 and V77-600 as it did on the previous V76, he said.

The minimum requirement for Cobol is 96K bytes, he indicated.

Cobol is a key language in the transaction processing field, he added.

As Varian defined its commercial market, it enhanced its Cobol to accommodate transaction processing, he said.

The compiler costs $5,000 when purchased separately; the firm also offers packaged systems which include software, he said.

Varian installed its first Cobol system in late 1975, he added.

Data General Corp.'s Cobol on its Eclipse series takes 48K bytes and a 128K system is the minimum recommended, according to David Gilbert, product marketing specialist.

DG offers Cobol on its Eclipse series because of the demand from the commercial segment of the market as well as from large firms turning to distributed processing, he said.

Although DG has seen a high demand for its RPG-II on the Eclipse because of its "near compatibility" with that of IBM, Gilbert said in general the demand is higher for Cobol.

DG's Cobol compiler costs $7,000.

### Part of Philosophy

Harris Corp.'s Cobol is offered as part of the firm's philosophy of having machines with multiuse capabilities, according to Joe Lewis, manager of software products.

The firm's marketing thrust is to try to service the customer with several needs, he remarked, and it provides the ability to run several languages concurrently.

Harris has had its Cobol since May 1975. It runs under the Vulcan operating system on the S100 and S200 series, he said.

There is quite a lot of demand in the multiuse environment for Cobol, Lewis said.

Harris recommends a minimum of 64K words since it thinks multiuse machines will need more than a single task user. The price of the Cobol is bundled in with the system, Lewis said.

General Automation has seen increasing demand for Cobol both from its OEMs and end users, according to Marv Silverman, manager of data management.

"Anybody wanting to stay in the DP, mini-type business at this point in time who does not have Cobol is probably in trouble," Silverman stated.

GA has had its Cobol for about a year and a half, Silverman said, and features are being added to bring it up almost to Level 2 of the Ansi 1974 standard, he said.

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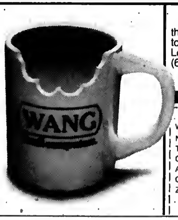

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## Mainframe Program Discontinued

# IBM's Leasing Strategy Undermined Memorex: Trial

By Catherine Arnst
Of the CW Staff

NEW YORK — Justice Department attorneys participating in the U.S. vs. IBM antitrust trial here have presented the Memorex Corp. story as a case history of the financial risks involved in a leasing environment, an environment which they charged IBM created to maintain its alleged monopoly postion.

Two witnesses from the Bank of America recently described how Memorex evolved from a successful peripherals company on the verge of entering the mainframe market to a debt-ridden entity in 1974 that owed the bank $160 million. The mainframe program was discontinued even though its first two computers, the models 40 and 50, were judged to be successful, testimony showed.

At the beginning of the 1970s, Memorex was described by the Bank of America officers as a company with a history of successfully meeting its sales projections. Its product line was of high quality and it had an outstanding sales and service organization and the technical capacity to improve its product line, according to Richard Saalfeld, a vice-president of the bank, and Alvin Rice, executive vice-president.

### Growing Pains

By 1970, Memorex had successfully entered the peripherals market with a disk file system that was in direct competition with a similar IBM product. The company was growing fast and experiencing some growing pains, Saalfeld testified.

Memorex was also trying to raise funds to finance its Independent Leasing Co. (ILC), which would provide a vehicle for leasing its peripheral equipment and, later, its mainframes.

"The market has been conditioned for many years by IBM to lease computer equipment, rather than purchase it. At this time, IBM only offered leases which were for a one-year term, with 90-day cancellation privileges after the one-year period.

"In order to compete effectively, Memorex must offer comparable terms to the IBM lease," Saalfeld wrote in an analysis of Memorex for the Bank of America in Feb. 1972.

"The leasing of computer equipment to users by manufacturers has the effect of putting the manufacturer-lessor in the business of financing the user's acquisition of capital assets. Without such leasing, the user would be required to finance the purchase or lease of such equipment from internal cash flow . . . or borrowing . . . the manufacturer-lessor of computer equipment therefore has unique and extraordinary financing needs — [it] must raise capital to finance the leases and [it] must raise capital to finance [its] own operations," Saalfeld wrote.

### Risks of Leasing

A leasing market has more risks involved than straight sales Saalfeld testified. But Memorex went into that area anyway because it felt that was the only way it could effectively compete against IBM, Lawrence Spitters, former chairman of the Board of Memorex, had testified earlier in the trial.

In addition, Memorex needed a lease base to market its mainframe, Spitters said.

Memorex wanted a market where it could take the initiative rather than wait to see what IBM would do next, Spitters said. His company had already suffered losses when IBM cut its prices on its disk file systems in 1971.

Memorex's product strategy was to market its plug-compatible products at a price 20% below IBM prices for a comparable product, Saalfeld said. And when IBM cut its prices, Memorex followed suit.

This cut reduced its 1971 profit margins with the result that Memorex had greater difficulty obtaining outside financing, he added.

In a study of Memorex done for the Bank in April 1971, Saalfeld wrote "1970 was quite an unusual year for Memorex and the company [was] forced to operate under conditions which were not self-imposed."

Those conditions included the IBM price cut and the accounting controversy in which Memorex became involved when the Securities and Exchange Commission took issue with the company's practice of accounting for transactions with ILC as sales, Saalfeld wrote.

The Bank of America had not lost its confidence in the company's ability to successfully overcome those problems at that point, however, according to the study. It stated "1971 is anticipated to be a period of consolidation where the company can operate within a more normal environment. The new equipment has been well-received and Memorex is highly regarded as one of the top leaders in the computer peripheral equipment field."

In May, 1971, IBM announced price cuts of 15% on its peripheral equipment and offered the Fixed Term Plan, which gave rental customers lease plans of 12 and 24 months on peripherals and slashed monthly payments by 8% and 16% respectively. Memorex was forced to meet those terms to remain competitive, and its profits were thus effectively lowered, Saalfeld said.

### Bottom Line

The bottom line of this action was that Memorex became less profitable and so had a more difficult time achieving financing. Still, the results of a July 1971 survey of Memorex users showed Memorex was considered to have "a very good marketing force, very good servicing force, good 'strategy' in products, good engineered products and good company name and size."

The survey concluded that the main difficulties facing Memorex would be continued price erosion of disk file products, customer acceptance of new products and entrance into the mainframe computer business, Saalfeld's 1972 study stated.

Memorex suffered further in the eyes of potential investors during 1972-1973 because of internal management struggles, both Saalfeld and Rice testified. Spitters and chief operating officer James Guzy disagreed on which course the company should take to pull itself out of debt and members of middle managment were taking sides, thus splitting the company, Saalfeld wrote.

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# Wangco Branching Out Into Broader Peripherals Mart

By Toni Wiseman
Of the CW Staff

LOS ANGELES — Wangco is gradually escaping the image of being a tape company and is becoming a broader gauge peripheral supplier, according to George Toor, vice-president of marketing.

The company has been a leader in tape for seven years and has been manufacturing disks and cartridges for three to four years, Toor said. This latter category includes a quasi-proprietary 20M-byte model while most other manufacturers' products are limited to 10M bytes.

Wangco also has in development a large disk storage device, Toor said. And, through the acquisition of Orbis, Inc., the company has ventured into the floppy disk business, recently introducing a microfloppy in direct competition with Shugart Associates.

Wangco itself was acquired by Perkin-Elmer in June 1976 on a pooling-of-interests basis. Its financial picture has brightened in the past year. Revenues in 1976 rose to $30.5 million from $20.7 million in 1975. Earnings made a more spectacular showing, jumping from $871,000 in 1975 to $2.08 million in 1976.

In addition to marketing its line of tape and disk drives to OEMs, Wangco produces controllers, making it possible for the firm to offer complete subsystems mated to specific minicomputers such as Digital Equipment Corp. PDP-11s and Data General Corp. Novas.

### Diversification Move

Toor stressed his company is interested in other area of peripherals development.

"I really feel there is no area of peripheral equipment development and manufacturing we should not consider interesting," he said. But, he admitted, "the likelihood of our going largely to terminals is greatly reduced by our association with Perkin-Elmer Terminal Systems."

This broadening of product offerings could be accomplished through internal development, acquisition of a firm or through licensing. "Any of these is an acceptable means of progression; the determining factors are economics and timing," he said.

The diversification move is in motion right now with the development of a higher capacity disk drive, Toor pointed out.

Diversification aside, disk drives and associated products will probably continue to be the company's single major product area in the coming year in terms of revenues and monthly shipments, Toor indicated.

This is primarily because the growth of tape drives is not what it used to be, he added. But, he emphasized, this does not mean that tape sales are declining; rather, they are not experiencing as rapid a growth rate as they have in the past.

"I expect microfloppies will really be a significant product for us, which implies large-volume shipments because of the product's low price, between $200 and $250," he said.

### Acceptance Will Take Time

It is still too early in the product's life to say with any certainty just what the microfloppy's success will be, Toor said, noting the microfloppy has not been available either from Wangco or Shugart for very long.

"Also, because it differs from the 'standard' floppy, its acceptance and adoption will take a little time," he said.

Toor does not feel the lack of a published industry standard for mini or microfloppies is significant; it is the application which is important, he believes.

"Some applications rule out the necessity of interchangeability, such as isolated storage on terminals, in which case the data exchange is electronic through data lines and not through the diskettes. Even if the media are exchanged, in this case it is generally between like devices," he said.

Several trends in the DP area are contributing to Wangco's success, such as distributed processing and the decline in the price of minis. The advent of micros has also opened up the market, Toor stated.

"People are less concerned today than in the past with having a single source for everything in their system. This is particularly true of our supplying products to subsystem or system manufacturers, he noted.

Toor ponted out increasing recognition by users and OEMs of independent suppliers' ability to support and educate their customers, who are then in turn able to support their end users. This, he said, is a very healthy trend for Wangco and others in this business.

### Reducing Big Companies' Dominance

"And I would hope it would reduce the probability of there being the development of a few monolithic companies — reduce the dominance of our business by one, two, or three big companies," he said.

Wangco will experience a 33% to 35% growth this year, a rate it would like to continue. This means diversifying and taking advantage of other markets, Toor said.

But Wangco's policy is not to get involved in radically new or insubstantially proven technology. "Rather, we prefer to adopt and adapt well-proven technology to our markets and to the intentions of the users and prospects we serve," he explained.

"We're certainly vitally interested in new technology, but we're not anxious to adopt it in advance of successful use in the field," he said.

# Future DP Networks Seen Evolving Around More Powerful Minis

LOS ANGELES — More computer power in smaller packages at lower cost will be a major factor in the continuing evolution of DP networks, according to C. Allan Conover, Honeywell Information Systems, Inc. vice-president for systems planning and programs.

"The computer hardware price/performance improvement evolution [will continue] on an upward, exponential curve . . . In fact, we soon will be able to dedicate complete minicomputer systems to functions that formerly required central processor capabilities," Conover told a recent conference here.

"While large-scale systems will continue to play a primary role, the minicomputer will be a key element in future system architectures," he continued. "The minicomputer is the ideal tool for off-loading selected, time-consuming functions from the central processor and distributing them to work units within the network."

Computing, according to Conover, is evolving toward distributed processing because of the improved response time, decreased communications and personnel costs and better systems control features. Additionally, networks can be configured to provide 100% availability because each element can operate free-standing as well as in conjunction with the rest of the system.

"These systems in the 1980s will consist of four critical units that may be found in one room spanning the globe," Conover said.

"The transmitting unit may be a single dial-up or dedicated phone line or a vast satellite-based system. The computing units may be dedicated or general-purpose. Storage units will be centralized, distributed, hierarchical or relational, and a myriad of different access units may become the critical and highly tailored interface terminals between people and the networks," he predicted.

Access units could be application specific, such as point-of-sale terminals commonly found in supermarkets and retail establishments. They might also be automatic and continuous, much like on-board computers on an airplane interacting with command systems to provide mission-related data and operational status to ground-control stations.

Conover called for closer cooperation between the vendor, user and academic/consulting worlds to develop specific requirements to ensure successful progression toward the distributed systems environment of the 1980s.

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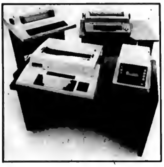

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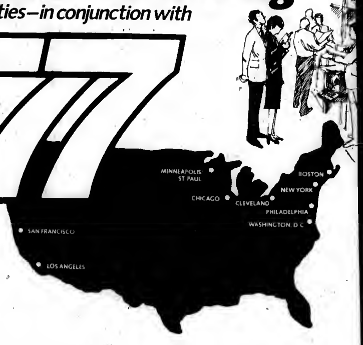

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# U.S. Service Revenues Gaining Abroad Despite Foreign Government Barriers

**By Edith Holmes**
Of the CW Staff

WASHINGTON, D.C. — One in every five dollars of U.S. sales abroad is now earned by a provider of services rather than by a seller of goods, according to the first comprehensive study of U.S. service industry participation in world markets recently completed by federal officals here.

Computer and communications services were included in the 18 industries covered by the report. In fact, their representatives were among those in the service industry as a whole who requested the study, contending their growing worldwide participation had not received adequate public or government attention.

American firms began commercialization of computer services earlier than most foreign competitors and currently are regarded as the worldwide leaders, according to the 450-page report generated by a task force of members from 12 federal agencies.

## International News

### Nuisances, Not Impediments

U.S. communications services companies have had a difficult time abroad, however, because communications is a regulated, government-operated monopoly in almost all parts of the world, the study stated.

Government-sponsored and financed consortiums are making competition difficult for these U.S. companies, and regulations sometimes require a fixed percentage of local company participation, the report said.

Communications services firms further believe the International Telecommunications Union, which is overseen by the United Nations, is an effective forum for the solution of operational problems, the report added.

### Major Problem

A major problem identified by the computer industry in its markets abroad is the growing tendency for many countries to require that data files remain in the country of origin rather than be transmitted to computer banks in the U.S.

In addition, foreign countries restrict the return to the U.S. of invested capital and profits provided and generated by American firms, the study said.

Finally, in some cases, foreign government-controlled transmission facilities such as telephone lines hamper the establishment of computer networks by U.S. firms, the report noted.

Some foreign governments are concerned about the newness and technical complexity of the computer service industry. They find its intangible products difficult to tax and regulate in international trade, the study concluded.

Other countries are worried about the lack of local alternatives to U.S. computer services, but the relatively low profile of U.S. firms in this field and the necessity for their services has so far kept their problems at a minimum.

Copies of the report, "U.S. Service Industries in World Markets," can be purchased from the National Technical Information Service (NTIS), U.S. Department of Commerce, Springfield, Va. 22161. The NTIS accession number on the study is PB-262528/AS and should be included in any order.

The study is available in paperback for $11 and on microfiche for $3.

# 'Share-a-Booth' Plan Offered at Ifip Show

TORONTO — Small and medium-sized companies will be able to participate in the International Federation for Information Processing (Ifip) Congress 77, an international DP show, thanks to a "share-a-booth" plan.

Radley Communications Ltd., which is sponsoring the plan under the auspices of the Ifip Congress, is offering two plans. One offer covers quarter units of a booth, while the other covers a literature display table. Both include staffing.

The Ifip Congress 77 will be held Aug. 8-11 in the Sheraton Centre here.

Additional information on the share-a-booth plan is available from Radley at 509 Madison Ave., New York, N.Y. 10022.

# Nigeria Boosting DP Training

**By Ivan Berenyi**
Special to Computerworld

LAGOS, Nigeria — Nigerian universities are taking urgent steps to counter a growing shortage of qualified and experienced staff to run the country's computers.

Computers are being used here for everything from engineering calculations related to the all-important oil industry to compiling the country's new telephone directory.

But this has led to what Nigeria regards as an undue dependence on foreign specialists, lured here by lucrative short-term contracts. It is an expensive way to provide computer staff, and Nigeria has in the past found such specialists unreliable and disinclined to train local successors.

It is, in any case, a solution which impedes the "Africanization" policy to which Nigeria, like many independent African countries, is committed. So far, only a handful of qualified Nigerian computer specialists have been trained - some by studying overseas and some by in-house courses offered by IBM in Lagos.

Now the universities of Lagos, Ibadan and Ife, the three cities where the shortage of computer staff is felt most, have introduced degree courses in computing. Ibadan graduated its first 24 computer sciences students at the end of the last academic year.

In the north, Ahmadu Bello University has started a combined course in mathematics and computing.

The universities' efforts to cure the manpower shortage are themselves frustrated by lack of staff.

"We now have a senior staff of eight systems analysts and programmers, but vacancies still exist," according to Dr. Olu Longe, director of Ibadan University's computing center.

### Recruiting Problems

"We continually advertise these posts. Qualified candidates are few, competition for them is keen and the universities cannot offer remunerations as attractive as those offered by oil companies and others in the private sector.

"It is hoped that the combined output of the universities' new courses will gradually alleviate the acute shortage of staff," he said.

Ibadan University which in 1966 inherited the building and the 1620 mainframe of IBM's African Education Center, currently has a 256K-byte 370/135 backed up by 3330 disks, 3410 tapes and two high-speed printers.

A similar configuration is in use at the University of Ife. Nigeria University is another 135 user and Benin University is about to upgrade its 360/25 to a 135.

Lagos has the largest machine, a 145, backed up by 1319 disks and a 1403 printer.

Only Ahmadu Bello University is steering a non-IBM course, having recently switched from an International Computers Ltd. 1902A to a $2.3 million Control Data Corp. Cyber 72 installation.

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## COMPUTER MANAGEMENT

### UNITED KINGDOM

World rank as DP market: *Fourth*
1975 DP expenditures: *$2.7 Billion*
1975 imports from US: *$270 Million*
Rank as importer from US: *Third*

**Computer Management** is a monthly magazine recently purchased by *Computerworld, Inc.* Monthly circulation is 30,000.

## COMPUTERWOCHE

### GERMANY

World rank as DP market: *Third*
1975 DP expenditures: *$3.7 Billion*
1975 imports from US: *$274 Million*
Rank as importer from US: *Second*

**Computerwoche** is a weekly tabloid newspaper started by *Computerworld, Inc.* It has a circulation of 21,000 to the West German computer community.

## SHUKAN COMPUTER

### JAPAN

World rank as DP market: *Second*
1975 DP expenditures: *$4.6 Billion*
1975 imports from US: *$189 Million*
Rank as importer from US: *Fifth*

**Shukan** is a weekly tabloid newspaper, jointly owned by *Computerworld* and Dempa publications. Circulation is 35,000.

## ZERO-UN INFORMATIQUE

### FRANCE

World rank as DP market: *Fifth*
1975 DP expenditures: *$2.5 Billion*
1975 imports from US: *$223 Million*
Rank as importer from US: *Fourth*

*Computerworld* represents **Zero-Un Informatique** in the US. Zero-Un has three publications, one a weekly tabloid newspaper with circulation of 22,000; the second a monthly magazine, circulating 13,000 copies; and a new bi-weekly, Minis and Micros. All circulate throughout Europe's French speaking computer market.

## DATANEWS

### BRAZIL

World rank as DP market: *12th*
1975 DP expenditures: *$250 Million*
1975 imports from US: *$60 Million*
Rank as importer from US: *(Est) 10th*

**DataNews** is a bi-weekly tabloid newspaper in Portuguese with an English-language summary. It is owned by *Computerworld, Inc.* and has a circulation of 7,000.

*Computerworld* now has sister publications in five leading international markets for US computers and computer-related equipment. These markets import in excess of a billion dollars of US-made computer products. The publications are operated and edited by local experts, and published in the language of the computer people they serve. And they do an excellent job of covering their markets.
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# DP Industry Fares Well in Ranks of Fortune 500

**By Toni Wiseman**
Of the CW Staff

CHICAGO — The Fortune 500 results are in and the consensus is that the computer industry fared rather well as a whole.

There are some strange relationships however, such as the fact NCR's revenues were almost exactly equal to IBM's earnings.

Among those comprising the office equipment category, which includes computers in *Fortune* magazine's listing, Digital Equipment Corp. made the largest gain, jumping 46 places from 326 to 280.

Fairchild Camera & Instrument gained 107 places, ranking 404 this year, but *Fortune* does not separate DP-related sales and profits from other areas.

## Financial News

With an industry median of 46.06% on total return to investors, Teledyne Corp. ranked highest for all industries with 223.53%; Memorex Corp., second with 217.96%; General Instrument, sixth with 151.93%; and Lear Siegler, Inc., eighth with 142.22%.

Over a 10-year period, 1966-1976, Digital Equipment had the third highest total return to investors for any industry, showing a return of 32.03% when the office equipment industry median was only .6%.

IBM ranked eighth in return on sales for all industries, with a return of 14.7%. Office equipment as an industry showed a 3.9% return.

On the debit side, Honeywell had one of the largest decreases in sales, 9.6%, while the office equipment industry as a whole showed a 9.3% increase.

### Memorex Ranks

Ranked 481, this was the first year Memorex Corp. made the ranks of Fortune 500; Fairchild returned to the listing after a two-year absence. It was 421 in 1974, 404 this year; it ranked in the Fortune 1000 last year.

As usual, IBM led the DP firms on the list, but fell one position to eighth this year with sales of $16.3 billion.

The top-ranking company this year was again Exxon, with sales of $48.6 billion.

IBM was, however, fifth in assets and third in net income behind Exxon and General Motors.

Minnesota Mining & Manufacturing rose three ranks to 53, while Sperry Rand Corp. dropped two places to 62 and TRW, Inc. held firm at 71.

Honeywell lost 21 places, dropping to 88, but was 66 in terms of assets. NCR remained at 96 but led Honeywell by two places in assets at 64.

Teledyne gained four places on the listing, rising to 114, as did Burroughs Corp., rising to 120, while Texas Instruments, Inc. jumped 19 places to 133.

Control Data Corp., on the other hand, slipped three to 173, but ranked 90 in assets.

Hewlett-Packard Co. rose seven spots to 200, DEC soared 46 to 280, but Lear Siegler dropped three to 292.

Perkin Elmer rose an impressive 25 places to 473; not to be outdone, Memorex jumped 60 places to 481.

Foxboro Co. closed out the list at 500.

# Honeywell Revenues, Net Climb in First Quarter

MINNEAPOLIS — Gains in all the major segments of Honeywell's business combined to produce increased revenues, net income and earnings per share in the first quarter of 1977 compared with the first quarter a year ago.

Edson W. Spencer, president and chief executive officer, said the rate of increase achieved in the first quarter will not continue through the year because comparisons in the next three quarters will be with stronger performances in 1976 periods.

Spencer said he continues to be optimistic about the company's prospects in 1977. "The increase in sales volume together with the results of cost reductions made in the last two years, should continue to have a favorable effect on operating ratios," he explained.

Honeywell's worldwide sales, rental and service revenues in this year's first quarter were $662.8 million compared with $534.2 million last year. Net income for the quarter including extraordinary income was $30.9 million compared with $13.6 million. Earnings per share for the first quarter of 1977 were $1.47 compared with 68 cents per share in the first quarter of 1976.

Continued strong demand for energy-management controls contributed significantly to increased first-quarter sales and earnings, Spencer stated. He also noted growing backlogs attributable to increasing capital expenditures in industrial markets served by Honeywell.

### Strong Worldwide Bookings

The fourth-quarter pattern of strong worldwide computer bookings carried over into the first quarter of 1977, Spencer said, noting that bookings and operating margins in the computer business improved substantially over the first quarter of 1976.

First-quarter computer rental and service revenues increased 14.3% over the comparable 1976 period to $138.7 million and combined with higher outright sales to provide a "marked increase" in total worldwide computer revenues, Spencer said.

All the company's Control Systems Division's major operating units reported increased orders and revenue over the first quarter of 1976, Spencer indicated. The increases in international markets were "modest" in comparison with domestic improvement, he noted, adding the outlook in Canada, Europe and Japan is "still uncertain."

Spencer said he believes inflationary pressures continue to pose the largest single threat to worldwide economic recovery.

"Some progress has been made in reducing the inflation rate, but there are still signals that it may increase again late this year or next. Public officials and economists are now talking about a base inflation rate of 5% to 6% or higher in the U.S., and that is unacceptably high if we are to have long-term, stable economic growth," he said.

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# Executive Corner

- Lyle D. Altman has been appointed to the new post of executive vice-president and chief operating officer of Network Systems Corp.
- Kenneth R. Whitehouse has been elected vice-president of Decision Data Computer Corp.
- Marc P. Desautels has been named vice-president and treasurer for the Data Products and Financial Services Groups of Itel Corp. and Jack Chapple has been named vice-president and general counsel for Itel's Computer Products Division.
- H.D. Elverum has been appointed group vice-president of Honeywell's Components Group in its control systems operations.
- Warren Lewis has been promoted to vice-president of engineering at Computer Power Systems Corp.
- F. Gordan Smith has been elected senior vice-president of sales for Information Science, Inc.
- John E. Poturny has been appointed vice-president of marketing and chief operating officer at Data Processing Power.
- Dennis J. Buckley has been named vice-president of engineering at Dataroyal, Inc.
- Dr. W.M. Barnes has been appointed vice-president of Collins Communication Switching Systems.
- Lawrence E. Tobin has been appointed vice-president and general manager of the Data Guard Security System.
- Henry Caplan was appointed divisional vice-president for corporate development of On-Line Systems, Inc.
- Allan Haynie has been appointed vice-president and general manager of the Genesis One Products Corp. production and engineering facility in Houston.
- Robert F. Friedman has been named vice-president of satellite communications at California Microwave, Inc.
- Walter Mitchell has been appointed senior vice-president and chief marketing officer at Instrumentation Engineering, Inc.
- Henry D. Epstein has been appointed group vice-president of Loral Corp.
- Robert V. Coleman has been promoted to vice-president of technical services; Durwood J. Garrity to vice-president of fiscal management and Guy T. Rose to vice-president of national sales for McDonnell Douglas Automation Co.
- Charles E. Splaine has been named vice-president of sales for Memorex Corp.'s Equipment Products Group.
- Robert N. Goldman has been named vice-president of productive development for Cullinane Corp.
- Matthew P. Crugnale has been named as head of worldwide sales operations for Beckman Instruments' Electro-Products Group.
- James Vance was elected senior vice-president and chief financial officer and Frederick P. Gossens was named vice-president of manufacturing for General Automation, Inc.
- Donald K. Lane has been elected executive vice-president of Software International Corp.
- Samuel W. Thompson was appointed vice-president of marketing for Data Electronics, Inc.

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- **PERFORMANCE ANALYSTS**
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Computer Science degree is desirable but not mandatory. Positions will be based at UNIVAC's Worldwide Headquarters near Philadelphia with relocation assistance provided. Candidates should be open to travel assignments. For confidential consideration, please submit resume and salary requirements to:

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### SENIOR INSTRUMENT SCIENTIST

Develop minicomputer laboratory acquisition and control system with total project responsibility from initial user communications through installation and user training. Must have strong working knowledge of minicomputer programming (Assembler & FORTRAN); minicomputer hardware; analog and digital interfacing; logic design. Advanced EE or equivalent with at least 5 years experience in PDP-8 and/or PDP-11 laboratory applications. Life science experience a desirable plus.

### SENIOR MINICOMPUTER SYSTEM ANALYST

Plan and implement the integration of laboratory data acquisition minicomputers. (PDP-8-S & PDP-11-S) and satellite data concentrators (PDP-11-S), with central DEC system-10 processor. Must have strong minicomputer software background (Assembler, FORTRAN, operating systems), preferably with DEC computers. Advanced degree in EE, Computer Science or equivalent, with at least 5 years experience in laboratory applications.

### SYSTEMS PROGRAMMER

DEC-system-10 systems programming, including planning for initial system installation; monitor generation; TOPS-10 and communications software; planning and installation of DECNET; development of system standards and performance evaluation. At least 2 years experience as a DEC-10 system programmer

### MINICOMPUTER ANALYST/ PROGRAMMER

Design and develop minicomputer applications programs for laboratory data acquisition, control and analysis systems interfacing with central DEC system-10 research computer. Degree in EE or equivalent. Related experience in laboratory minicomputer programming (preferably PDP-8 and/or PDP-11).

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But some things haven't changed. Like the exciting and challenging environment. Like our excellent compensation and benefits package. Like our friendliness, regard for human feelings, and the sense of involvement that has characterized the company since we began. And we're still growing. Which is why we need help; from the same kind of competent, enthusiastic individuals who helped make us the exceptional company that we are today.

## COMPUTER SYSTEMS ARCHITECTURE

Our Systems Architecture group is looking for talented professionals to help architect future high-performance computer systems. You should have a broad educational background in EE or CS with emphasis on computer architecture or design and be familiar with most of these areas: computer systems organization; storage systems organization; operating systems theory; assembler/high-level languages; data base fundamentals. Combined hardware and software experience and familiarity with system 370 is desirable.

We have immediate openings for the following positions.

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You will be a key decision maker on an architecture team. You have experience in either computer systems architecture, design, operating systems or data base systems design.

### STORAGE SYSTEMS ARCHITECT

You will be key in defining the architecture of future storage and data base sub-systems. You have experience in either of these areas.

### SYSTEM PERFORMANCE ARCHITECT

You will be the performance specialist on an architecture team. You have extensive experience in computer system performance measurement, evaluation, and modeling with emphasis on architecture.

### SOFTWARE SYSTEMS ARCHITECT

You will be a software systems specialist on an architecture team. You have an architectural orientation and experience with operating systems/data base, preferably on system 370.

### SYSTEMS ARCHITECT

You will be a member of an architecture team working on diverse investigations. This position offers tremendous educational and advancement opportunities. You have at least 2 years' related experience or the equivalent.

## COMPUTER PERFORMANCE MEASUREMENT/ EVALUATION ENGINEERS

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You will be responsible for a continuing performance measurement and analysis project on various systems and workloads. You have extensive measurement experience with hardware and software measurement tools, preferably on system 370.

### PERFORMANCE EVALUATION ENGINEER

You will be responsible for application of analytical and simulation models for evaluation of architecture or design alternatives. Hopefully you have at least 2 years' work experience or the equivalent.

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field engineering

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Manager, Operations and Training Section. A major function of the Division is to provide a scientific computing service for CSIRO Divisions and certain Government Departments and Universities. This is achieved by the CSIRONET network, at the centre of which is a Control Data Cyber 76, an advanced computer capable of averaging 15 million instructions per second, with 5 thousand million characters of on-line storage. The central installation is connected to the network by front line nodes (DEC PDP-11s), and there is a succeeding fan-out complex of further PDP-11s, and Telecom lines of various speeds from 48 kilobits/sec down. The network software has evolved to a multi-host design, and future developments are expected to take advantage of these features.

The traditional services of operations, education and training, documentation, and management services and customer relations activities are undertaken. Research studies at present include operating systems for computers and networks, simulation, information systems, graphics and image analysis, and classification methods.

**DUTIES:**

Responsible to the Director of Computing Services for the management of all aspects of the central and remote operations sections (host and network computers) in many locations throughout Australia, and for the education and training activities of the Division. The appointee will be responsible for negotiations with users concerning special operational requirements and for the technical administration of computer maintenance contracts.

**QUALIFICATIONS:**

A degree or equivalent qualifications in science, engineering, arts or management science. Proven management ability in relevant field is essential, and extensive operations management experience in a major computing establishment controlling a substantial network is desirable. Some experience with operating systems for a large computer and/or communications network would be an advantage.

**SALARY:**

Experimental Officer Class 5: $A20163-$A21352 p.a.

**TENURE:**

Indefinite with Superannuation. Applications stating full personal and professional details with the names and addresses of at least two referees and closing quoting reference number 900/312 should be forwarded to:

THE CHIEF
DIV. OF COMPUTING RESEARCH
CSIRO
P.O. Box 1800
Canberra City, A.C.T.
2601 AUSTRALIA
Resumes must be forwarded
by June 13, 1977

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## SYSTEMS PROGRAMMER

Pittsburgh National Bank requires an experienced Systems Programmer to participate in the installation/maintenance of IBM 370/158 MP Operating Systems Software.

Related responsibilities will include system generation planning and execution, system performance measurement and tuning, system modification, and installation of software packages.

Experience with MVS or VS2 and BAL required. If you have a background in Software for Technical Support, Please submit a resume including salary history to: Sharon W. Council, Personnel Division.

**PITTSBURGH**
**NATIONAL BANK**
5th & Wood Street
Pittsburgh, PA 15222

*All replies will be kept confidential.*
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## DIRECTOR MANAGEMENT INFORMATION SERVICES

The Minnesota Educational Computing Consortium, a statewide computer services consortium serving all levels of Minnesota education seeks a director for its Management Information Services (MIS) division. Activity includes implementation of a regionally-based management information system for public schools in Minnesota. Leadership and skill in working with diverse educational users essential. Will be responsible for approximately thirty professional staff. Management experience in education, data processing and related projects highly desirable. Advanced degree desirable. Salary based on experience and training. Submit resumes and references to Dr. John Haugo, Executive Director, MECC, 2520 Broadway Drive, Saint Paul, Minnesota, 55113. Application deadline May 20, 1977.

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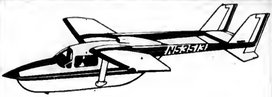

## PROGRAMMER - ANALYST

The Pawnee Division of Cessna Aircraft Company, the world's leading producer of business, utility and personal single engine aircraft, has an excellent opportunity for you. The position is available immediately and offers individual growth potential with the company which has maintained a dominant position in worldwide aviation production and sales for many years. We are located in an exceptionally pleasant and progressive mid-American community which offers clean air, moderate climate, a broad range of cultural and recreational opportunities, fine schools, and three institutions of higher learning.

The individual we are seeking will have the opportunity to grow with our expanding EDP department.

Qualifications for this position include extensive experience in COBOL programming. Experience with data base structures and manufacturing systems would be considered valuable assets.

To find out more about this salaried position offering attractive benefits and competitive salary, send your resume and salary requirements to:

Employment Manager
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## SCIENTIFIC COMPUTER PROGRAMMER

Position now available in Building Engineering Department of a large manufacturer of Pre-Engineered Metal Buildings with at least 3 years of experience in scientific computer programming using the FORTRAN IV language, preferably on an IBM 1130 computer system. Some systems design experience is also desirable. Need a resume and a salary history. Resume should contain some details on the type of applications programmed. Degree in Civil or Mechanic Engineering a plus. The ideal candidate for this position should also have an academic preparation related to computer programming with special emphasis placed on scientific applications programmed. Send resume and salary history to:

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**Walker Parkersburg**
**Division of Textron Inc.**
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Qualified professionals are requested to submit credentials in confidence to:

D.C. Parsons — Employment Manager

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Dallas, Texas 75207

**DETROIT**
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202

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Miami, Florida 33169

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Compass, Inc
900 Asylum Avenue
Hartford, Connecticut 06105

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Constellation Enterprises
Suite 800, 5250 Wilshire Blvd
Los Angeles, California 90010

**MINNEAPOLIS/ST. PAUL**
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601 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402

**NEW YORK**
Sotal Associates, Inc
455 Lexington Avenue
New York, New York 10017

**NORTH CAROLINA**
TaskForce, Inc
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P O Box 8680
Greensboro, N Carolina 27405

**PHILADELPHIA**
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207 Fox Lane
Wallingford, Pa 19086

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Electronic Systems Personnel
100 Lawyers Building
428 Forbes Avenue
Pittsburgh, Pennsylvania 15219

**SAN FRANCISCO**
The Computer Resources Group Agency, Inc
305 Sacramento Street
San Francisco, California 94111

**SYRACUSE**
CFA Associates Personnel, Inc (Agency)
2530 James Street
Syracuse, New York 13206

**TULSA**
Data Processing Careers, Inc
Suite 10, Park 21 Building
2020 East 21st Street
Tulsa, Oklahoma 74114

**WASHINGTON, D.C.**
E&P Systems Corporation
Suite 215
1211 Connecticut Avenue N W
Washington, D C. 20036

Computer Personnel Firms interested in NCA Membership, write to: J. McNamara, 2555 W Grand Blvd., Detroit, Mich 48252

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# EDP AUDIT SPECIALIST

The St. Paul Co., Inc. is seeking candidates interested in EDP auditor position, primary responsibility will be the on going review of the control and security of general purpose support software. Will be involved in the review of new or modified data base data communication production system, to provide technical assistance in advanced system design for the EDP audit staff.

Experience with Data based or communication software is the prime requirement. Qualified candidates will have a minimum of 5 years exper. in data processing with knowledge of COBOL, BAL & IBM systems software.

These excellent positions offer a liberal benefit package, tuition reimbursement plan & attractive salaries. An opportunity to work for a recognized leader in the insurance business. Intersted persons should send resume or call 221-7005 for further information.

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Oppty to join an expanding hardware and software services company with many diversified client industries. Any experience IBM 360/370 IMS database and data communications COBOL, BAL or PL/1. $14-28,000 (FEE PAID)

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**PROGRAMMER/ANALYST**

Oklahoma based manufacturing co. seeks strong COBOL programmer with enough RPG to do RPG maintenance and take a leading role in the redesign & rewrite of our Existing systems in ANS COBOL. The new system design is toward MRP, Production Planning and Product Costing utilizing IBM's BOMP & Product Cost subset of IPICS. We now have cardless IBM S3/12 and are looking at IBM 370 within 3-5 years. We presently process for 3 subsidiary companies, 1 remote using 3741 with a printer. Salary is open, depending on qualifications. Please reply by June 1, 1977 with resume & salary requirements to: T. Menesco, c/o Bunte Candies Inc., 129 East California St., Oklahoma City, Oklahoma 73104.

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## Experienced Minicomputer Repairman

Must be talented enough to repair CPU's, peripherals, terminals, etc. Minimum of four years working experience. Established firm, little or no travel, no customer contact. Salary commensurate with experience. Send resume to Ray Newell at Newman Computer Exchange 1250 N. Main St., Ann Arbor, MI 48104 or call (313) 994-3200.

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## SYSTEMS ANALYST

N.C., S.C., Va. Fee Paid

S/A - experience package installation; P/A or S/A - Cobol, CICS; Sr. Sys. Anal. - CPA; Programmer Analyst; P/A - RPG II, CCP or financial or BOMP; Sr. Prog. Anal. - Assembler, Bill of Materials; P/A - Assembler, Banking; Programmer - Burr., COBOL, NDL; Data Base Administrator; Systems Programmer - VTAM, NCP; Systems Programmer - CICS, DOS

*Call or send resume to:*
Data Processing Dept.
**PERSONNEL PLACEMENT**
937D Huffman Mill Road
Burlington, N.C. 27215
(919) 584-5591

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## PROGRAMMERS/ANALYSTS

We are a solidy growing systems support company. Opportunities are available in our Chicago and Atlanta offices for the individuals wishing to become associated with a quality conscious organization & technical growth with appropriate compensation. COBOL, BAL, RPG II, BASIC OR MARK IV language capabilities & a desire to move along in your career interests us.

Contact: Peter S. Whittaker, Norrell Systems Services, Inc., 3099 Piedmont Rd., N.E., Atlanta, GA 30305.

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We are seeking an individual to manage a software development group which will be responsible for the design and implementation of operating systems, networks, language processors and other system software products. Requires management experience in software product development as well as a good technical understanding of operating systems and related software products.

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Total design and implementation responsibility in the development of diagnostic programs for central processing units, memories and peripheral control units with emphasis on communications and process control. Interact with development engineers throughout the product development phase. Experience in assembly level diagnostics required; microprogramming, microprocessor, and digital logic background desirable.

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Maintain current hardware diagnostic programs, investigate diagnostic software problems, design and implement corrections/enhancements to diagnostic programs, critique and assure performance of new diagnostic software. This position allows exposure to complete producct line and possible growth into development of new diagnostic programs. Assembly language background required; experience in digital logic and electro-mechanical devices desirable.

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Modcomp is expanding its language processing capability. We are developing an integrated compiler production system known as the Unified Programming System. UPS is state-of-the-art, employing everything from interactive high-level debugging to global program optimization.

**Senior Compiler Writer** — Minimum 2 years compiler experience, with proven skill in code generation techniques mandatory. Graduate degree in Computer Science. Familiarity with PL/I, FORTRAN, COBOL, PASCAL, ALGOL and other procedural languages desirable.

**Junior Compiler Writer** — Minimum 1 year compiler design exposure. Emphasis on automated parsing techniques and/or runtimer construction necessary. Degree in Computer Science.

**Technical Writer** — Minimum 2 years experience in the production of technical manuals for programming systems. Special emphasis on user manuals and reference manuals for programming languages preferred.

We offer competitive salaries, substantial fringe benefits and an outstanding opportunity for career growth and advancement. For further information call or send resume including salary history to:

Mr. Robert M. Coyner
(800) 327-5582 (toll free)
**MODULAR COMPUTER SYSTEMS, INC.**
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Requires on-line experience for systems development in Assembler Language, maintenance, program testing, and the installation of CDC and PDP equipment.

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Requires extensive experience in the design and implementation of, applications in an IBM OS/MVT or VS environment using MARK IV, COBOL, FORTRAN. TSO, IMS, IBM 3790 programming helpful.

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Requires 1-2 years experience in coding and debugging IBM 360/370 OS JCL, analysis and resolution of production abends, OS utilities, operations documentation review and turnover. Knowledge of MVS, TSO and hands-on computer operations helpful.

### SYSTEMS PROGRAMMERS

Requires experience in such areas as: MVS, JES II, TSO/TCAM, VTAM/NCP, VSAM, IMS and multiple languages, including ALC, COBOL, FORTRAN or MARK IV. Must possess ability to provide fast problem resolution, analyze and interpret performance data, recommend and develop standards.

We offer excellent salaries, benefits and growth opportunities. Send resume including salary history in strict confidence to; J.R. Brune, Dept. 002

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# SUPERVISION, ANALYSIS and PROGRAMMING

## *KUWAIT*

American Independent Oil Company, a wholly-owned subsidiary of R.J. Reynolds Industries, Inc., offers an excellent opportunity for a data processing professional to take charge of Analysis and Programming in our Data Processing Department located in Kuwait.

The individual selected will be responsible for directing all commercial and scientific application analysis and programming of current integrated system maintenance and new system development.

A college degree with a business oriented major is required. Applicants should have six to ten years experience in progressively more responsible positions in all areas of data processing, with at least two years recent experience as a project manager on a major system development. A thorough working knowledge of DOS/VS JCL and ANS-COBOL is required. Work with Assembler, Fortran, and CICS is beneficial.

Salary will be commensurate with experience. We offer excellent benefits, including liberal allowances and relocation policies.

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**P.E. VanNewkirk**
**Personnel Administrator**
**American Independent**
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**50 Rockefeller Plaza**
**New York, N.Y. 10020**
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# Programmer/Analyst

Expansion of progressive St. Louis financial institution has resulted in several openings for experienced Systems Analysts and Programmers. A working knowledge of COBOL is required, familiarity with BAL is helpful. Experience with on-line systems and/or Data Base Management System is preferred.

Our current system includes dual IBM 370 computers under OS, VS1 and an IBM 360/40 under DOS.

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# SOFTWARE LIBRARY COORDINATOR

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We are currently seeking a highly motivated individual to direct our microcomputer software library. The qualified candidate will have the following background:

- Software integration experience. Release and distribution of software products.
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- Ability to organize, establish and follow procedures and interface with a variety of users.
- Interactive programming experience using either FORTRAN or COBOL. CDC experience not absolutely necessary.
- Prefer degree in Computer Science, Math or Electrical Engineering

This is a highly visible and influential position throughout NCR as you will be overseeing day-to-day library operations and interfacing with domestic and international software developers and users.

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NCR

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**Industrial Relations**
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**NCR Corporation**
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# Banking

## Data Processing

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## $16-18K

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**The Personnel Office**
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## *with experience in Data Base Systems*

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*Tx/Okla/Ks*

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# COMPUTER SCIENCES

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| Oak Brook, Ill. | 312/986-0422 | Los Angeles | 213/386-5500 |
| Cleveland | 216/771-2070 | Palo Alto | 415/328-7155 |
| Detroit | 313/352-6520 | San Francisco | 415/434-2410 |
| Kansas City, Mo. | 816/474-3393 | Torrance, Ca. | 213/540-7500 |
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(When writing, please be sure to indicate home address and current position title.)

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721 Enterprise
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Send Resume In Confidence

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(203) 325-4159

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# ANALYST/ PROGRAMMER

Real opportunity to be an important member of a medium-sized, growing company. Experience in Cobol and design of file maintenance systems. RPGII knowledge helpful to redo some existing programs. Travel 40% of time for first six months. Some to Caribbean location. Salary open. Quick results better than sophisticated design. Send resume in confidence to: United Computer Services International Co., 215 East Waterloo Rd., Akron, Ohio 44319.

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**PROJECT LEADER**

Portland Co. is seeking a qualified person to spearhead a new corporate-wide project. Candidate chosen will be results-oriented with proven track record in Mfg. environment. Knowledge in production/inventory control. Strong user interface skills. IBM OS shop. Some travel. An outstanding career opportunity in the beautiful N.W. Excellent fringes with bonus plan. $18K-$23K.

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**PERSONNEL AGENCIES**
Call Howard Addington
One S.W. Columbia Suite 1460
Portland, OR 97259
(503) 222-9779

---

# PROGRAMMER/ ANALYST

Publicly funded college in Manhattan pursuing a management development project seeks highly motivated individual with OS experience. Excellent opportunity for person intersted in learning teleprocessing and data base systems. Excellent fringe benefits and good working environment. Salary to 16K. Send resume with salary history to:

CW Box 5033
797 Washington Street
Newton, Mass. 02160

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# PROGRAMMERS-ANALYSTS

Leading West-Coast-of-Florida hospital needs several analysts and programmers with experience in Hospital Medical Systems such as Real Time Order Entry, Nursing Care Systems, Lab and Pharmacy Systems. Prefer Burroughs Medium or Large Scale Systems experience. Systems to be developed on Burroughs B6800 utilizing DMS 11, Gamcos, Cande etc. Prior experience a must. Mail salary requirements and resume to Director of Data Processing, Memorial Hospital, 1901 Arlington, Sarasota, FL 33579.

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**FIELD SERVICE**

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$12-24K

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# Live and work in Iran...

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***Current positions available at our Data Processing facility in Tehran for Honeywell Professionals include:***

## SOFTWARE ANALYST

Prior background in Honeywell software support. Requires thorough knowledge of GCOS, GMAP and GRTS.

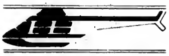
## PROGRAMMER ANALYST

Three to five years COBOL programming experience to include materials/maintenance management applications. Background utilizing TDS/TSS and Honeywell 6000 series mainframe required.

## COMPUTER OPERATOR

Requires at least two years operations experience on Honeywell 6000 hardware.

Must be U.S. Citizen



For immediate attention, please send resume in complete confidence to

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# EDP AUDITOR

The St. Paul is seeking candidates interested in the EDP Auditor position. These individuals will perform audit reviews of controls and security in EDP areas, participate in systems development reviews, develop and maintain computer audit programs and provide EDP expertise to the financial auditors. Qualified candidates will have several years work experience in data processing with knowledge of COBOL and IBM systems software.

These excellent positions offer a liberal benefit package, tuition reimbursement plan, attractive salary and an opportunity to work for a recognized leader in the insurance industry. For further information, please send resume to:

The St. Paul
Companies, Inc.
385 Washington Street
St. Paul, Minnesota 55102

The St Paul

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# SYSTEMS ANALYST/SYSTEMS ANALYST PROGRAMMERS

General Computer Services, Inc., a leader in Software development, is seeking several highly qualified individuals.

The candidates for Systems Analyst position must have in-depth knowledge of banking applications; payroll experience required.

The candidate for Systems Analyst Programmer must have a minimum of two years experience in COBOL; 360/370 experience required; financial experience required; payroll and OS experience desirable.

The positions to be filled are at the Company Headquarters in Huntsville, Alabama.

Send Resume To:

Personnel Department
***General Computer Services, Inc.***
P.O. Box 5148
Huntsville, Alabama 35805

# SOUTH FLORIDA

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## PROGRAMMING OPPORTUNITIES

Milgo Electronic Corporation, a leading manufacturer of data communications equipment, has immediate openings for qualified individuals in Information Systems/Programming.

## SYSTEMS SPECIALISTS

We need individuals with 2-5 years systems analysis and programming experience with business applications. A knowledge of ANS Cobol in an on-line data base oriented environment required. Experience with Univac 1100 series. Degree required.

## STAFF ASSISTANT

Reports to the Director of Management Information Systems. Responsibilities will include the development of documentation and programming standards for a data processing organization utilizing a Univac 1100 series.

Milgo offers excellent salaries, complete company benefits, liberal relocation allowance and an opportuntiy to join a group of highly creative people in sunny South Florida. To arrange for your interview, send your resume in complete confidence or call Den Haynes collect at (305) 592-8600.

**Milgo Electronic Corporation**
8600 N.W. 41st Street Miami, Fla. 33166
*Equal Opportunity Employer*

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# REGIONAL SALES MANAGER

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We're a young, super-marketing oriented company that manufactures Computer Power Centers aimed at data processing managers. We are seeking a Chicago-based sales professional who will turn-on to the opportunity to be part of a new idea, new company and new industry. The product steps down utility voltage to computer room voltage, then controls, monitors and distributes A.C. power throughout the computer room. We have excellent financing and a prestigious, active Board of Directors. We are attracting and recruiting only the most talented people who want to be in on the beginning of a big winner. Candidates must have a successful track record selling and managing in the end-user market. Experience in the market along with success in building a winning team is a must. 70% travel is required in a region that extends from Pittsburgh to Kansas City and south to Texas. Compensation includes a base, a % of sales, options company car and medical insurance. If you're committed to growth, then send your resume in confidence to:

Mr. John Poturny
**DATA PROCESSING POWER CORP.**
12648 Beatrice Street
Los Angeles, Calif. 90066

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# PROGRAMMERS/ ANALYSTS/EDP AUDITORS

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# SOFTWARE QUALITY ANALYST

Our International Division has immediate openings for Software Quality Analysts who will be responsible for design and implementation of test activities on new software applications. We prefer an individual with a college degree in Business Administration/Engineering/Computer Science plus 4-6 years experience in EDP, especially applications programming. These positions require knowledge of COBOL and Assembler type languages.

To investigate these outstanding career opportunities, send your resume to:

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Corporate Executive &
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## COMMUNICATIONS-SYSTEMS ANALYST/PROGRAMMER

This position requires experience which includes operating systems and communications; specific experience with CDC KRONOS/NOS is highly desirable. Knowledge of and interest in computer networking will be a definite asset. Demonstrated capability for team leaderhip and innovational ability is desired. Salary is negotiable, depending upon background, but is anticipated to be in the range of $18,000 to $22,000.

To submit application or for more information, please contact:

Dr. Duane L. Starner
Manager, Advanced Projects
Colorado State University
Computer Center
Fort Collins, CO 80523

Application deadline: May 23, 1977.

Colorado State University is an equal opportunity employer and complies with Title IX requirements. Complaints should be filed with the Office of Equal Opportunity, Student Services Building, Fort Collins, Colorado 80523.

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# PROGRAMMER / ANALYST

Our client, a major financial institution, seeks an individual with solid programming skills. Prefer experience with COBOL, BAL, and/or teleprocessing. $17,000, FEE PAID.

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PERSONNEL AGENCIES
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(801) 458-1860

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| CICS Specialist . . . .<br>Chicago | $25K |
| VM 370 SYS GEN . . .<br>& Upgrade-Chicago | $25K |
| DESIGNER ONLINE .<br>Gen ledger Sys-Houston | $25K |
| PROC. CONTROL . .<br>Consult Comp Appl-Houston | $24-36K |
| MINING ENGR COAL<br>Consult Comp Appl-Houston | $24-36K |
| ENERGY ECONOMICS<br>Consult Comp Applic-Houston | $24-36K |
| BUS SYS CONSULT .<br>MFG. exper-Houston | $24-36K |
| IMS APPL FIN SYS . .<br>South, East & West | $24K |

Call or write to Jay Allen EOP Search, 2401 NW 38th, Suite 200, Okla. City, OK 73112 (405) 525-8833.

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# SOFTWARE DEVELOPMENT SPECIALISTS

Infodata Systems, prominent in data base management and information retrieval systems, is looking for several Senior Software Development Specialists to participate in state-of-the-art software projects intended to create signficant innovation in the marketplace. Large scale software systems design and implementation in an IBM, OS, VS, or MVS environment is required. Comprehensive assembler language or PL/1 experience is also required. Familiarity with any of the following is desirable: OS/VS internals, data base structures, VSAM, or artificial language design. For the right persons, compensation will be exceptional. These positions are at our suburban Washington, D.C. office.

Send resume with salary history, or call:

Mr. Thomas O'Brien
Infodata Systems, Inc.
5205 Leesburg Pike
Falls Church, VA 22041
(703) 578-3430

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# Faculty Position

## Arkansas Tech University

The Computer and Management Science Department at Arkansas Tech has a nine-month permanent teaching position for an Assistant Professor starting August 22, 1977. Duties would include teaching Introductory and Intermediate level Computer Science courses and all levels of Quantitative Management Science courses. Minimum Qualifications: Masters degree with appropriate experience, coursework, and abilities. PhD is desired. Closing date is May 15, 1977. For information contact:

Don B. Mitchell, Head
Computer and Management
Science Department
Arkansas Tech University
Russellville, Ark. 72801

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# ANALYST PROGRAMMERS

(Large-Scale IBM environment;
Required: MODULAR PROGRAMMING, COBOL,
Preferred: VSAM, ASSEMBLER, CICS, CFMS)

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# Director Computing Services

**Duties:**

Coordinate all University computer operations and production in the central computer center, administrative programming department, and the academic computer lab. Accomplish long-range planning to include acquisition of all University software and hardware. May teach up to one-quarter time.

**Requirements:**

Master's Degree (preference for PhD). Experience in both college teaching and management of a computing center is highly preferred. One year in business programming or ADP development. Available September 1, 1977.

**Salary:**

$24,324 (maximum of $26,892 for outstanding qualifications including PhD).

**Applications:**

Director of Personnel, Southwest Texas State University, San Marcos, Texas 78666. Deadline: June 5, 1977. Southwest Texas State University is an Affirmative Action/Equal Opportunity Employer.

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# IMS Systems Analyst

Leading utility in the Pacific Northwest needs an experienced person to assist in the implementation and support of a 370/158 SVS IMS/DC system. Responsibilities include: DB design, performance tuning, modeling of DB structures, technical consultant to application analysts, standards recommendation and enforcement, and acceptance testing.

**Background should include:**

- IMS DB design experience or formal education
- Experience maintaining an IMS DB/DC system
- Extensive knowledge of IMS internal structure, IMS access methods, OS/VS functions relating to IMS, and DB applications and techniques.

Send all inquiries and resumes to the Recruitment and Staffing Coordinator, Room 1106, 920 S.W. Sixth Avenue, Portland, OR 97204. (503) 243-4355.

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***Neoterics adj. (LL. Neotericus; young) N. a modern person; one accepting new ideas and practices.***

Investment Plaza
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# PROGRAMMERS AND ANALYSTS

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Specialists - Data Processing
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Bethesda, Maryland 20014
(301) 654-9225

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5350 Poplar Avenue, Suite 412
Memphis, Tennessee 38117
(901) 767-5150

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65 William Street
Wellesley Office Park
Wellesley, Massachusetts 02181
(617) 235-4670

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Columbia, Maryland 21044
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1280 Route 46
Parsippany, N.J. 07054
(201) 335-8700

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Computer Source Division
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Rochester, N.Y. 14604
(716) 454-3888

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# PROGRAMMER ANALYSTS

Due to an increase in staff requirements, Computer Dynamics, Inc., has IMMEDIATE openings for trained data processing professionals.

Computer Dynamics, Inc., offers JOB STABILITY in a successful firm serving a wide variety of client companies in a diverse array of interesting assignments.

If you have a minimum of 3 years experience in any of the following on IBM, Burroughs, Honeywell or mini-computers we would like to talk with you now: COBOL, Fortran, Assembler, PL-1, IMS or CICS.

We can offer you a competitive salary, bonus program, profit sharing and comprehensive benefits including a dental plan.

Positions available in Michigan and Ohio. Please call or send resume to Mr. Rich Lai at:

**Computer Dynamics, Inc.**
**19400 W. 10 Mile Road**
**Southfield, Michigan 48075**
**(313) 357-4200**

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# ASSISTANT ADMINISTRATOR

The State of Iowa, Comptroller's Data Processing Division is accepting applications for an Assistant DP Administrator. Our large multi-function organization requires an individual with an extensive technical and management background. Proven ability to control, organize and communicate is essential. Successful candidate must have a degree (advanced preferred) and have a minimum of three years DP management experience. Please send resume, salary history and requirements to: Helyne Fiscel, Personnel Officer, Comptroller's Data Processing, 4th Floor Lucas Building, Des Moines, Iowa 50319.

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# EDP

Opportunities in the beautiful Pacific Northwest and Rocky Mountain region. Programmers, programmer analysts, systems analysts, scientific programmers. Call collect or mail resume with salary and geographical preference to **LARRY LEBLANC, CAREER SPECIALISTS**, 1703 Main St., Vancouver, WA 98660, (206) 695-1571 or (503) 248-9753 and/or **KEN MURNEY, CAREER SPECIALISTS**, 1200-112 NE, Suite 101, Bellevue, WA 98004, (206) 455-0582.

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# AGENTS WANTED

NCI, Inc., a leading systems software company with over 600 users, needs representation in most countries throughout the world. Our main products are SLICK, a Datapro award winning source library system (250 users), T.U.M.S., a utility maintenance system for use with Cincom's TOTAL data base (125 users) and a soon to be announced dynamic Disk Space Allocation System. Our products are primarily mailout and require very little technical support.

Frank U. Beck, President
National Computing Industries (NCI)
6075 Roswell Road
Atlanta, Georgia 30328 USA
Telephone: (404) 252-6478
Telex: 546642

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# EDP CONSULTANT

National firm in Northern California requires EDP consultants. Two positions available:

- Mid-level (to $18K) - Knowledge of EDP feasibility analysis, mini-computers and business systems analysis.
- Sr.-level (Salary Negotiable) - EDP project management skills and broad experience in business and governmental systems design.

Our clients include private industry and government. Please send your resume detailing specific experience, salary history and current requirements to:

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## FLORIDA

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# PROGRAMMING MANAGER

Company embarking on establishing a small but dynamic programming staff is looking for an experienced IBM 360 programming manager interested in getting in on a ground floor opportunity. Company is located in the Chicago loop and offers an attractive compensation and fringe benefit package. Send resume covering management and technical specifics along with salary requirements to:

CW Box 5040
797 Washington St.
Newton, Mass. 02160

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# PROGRAMMER/ ANALYSTS

***NCR Data Processing Division***
***has immediate openings***
***for Programmer Analysts ie:***

- **MIS Applications Programmer**
- **Software Development**
- **Firmware**
- **Diagnostic Programming**
- **O/S Project Lead**

(Design/implementation of multi-program O/S in a high level language. Experience desired in data base or telecommunications, distributed processing, virtual machine, time sharing).

Employees will enjoy excellent salary and top working conditions with a commercial employer. Fully paid life, hospital and medical plan for employees and dependents.

To arrange an appointment, please send resume immediately including salary history, training and experience to the Professional Placement Office at the address below.

NCR

Data Processing Division
16575 W. Bernardo Drive
San Diego, Calif. 62127

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# SYSTEMS/ANALYST

We're currently seeking a seasoned professional to take on the responsibility for the design and programming of retail banking systems. You'll also be responsible for the future direction and design of related systems, plus the evaluation of present systems, and preparing purchase proposals for software.

You'll need a BS or BA in business or computer science, with 5 years system design experience. You should also have 3 years programming experience using large scale IBM equipment and minicomputers, plus BAL, COBOL, or PL/1 with OS experience.

**Please send resume, including salary requirements, to CW Box 5039, 797 Washington St., Newton, Mass. 02160.**

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# SENIOR SYSTEMS PROGRAMMER

Our expanding Technical Support staff in Suburban Minneapolis needs a self motivated individual with the following qualifications:

- Sysgen experience in SVS, VS1 or MVS in a multiple CPU environment
- MVS maintenance experience

The following additional qualifications would be desirable:

- 4-6 years systems programming
- Knowledge of MVS internals
- NCP/VTAM knowledge
- CICS exposure
- VS1 to MVS conversion experience

We offer an excellent benefit and compensation package. Send your resume and salary requirements to Personnel Department:

**TARGET STORES**
**1080 73rd Avenue N.E.**
**Fridley, Minnesota 55432**

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# DATA BASE

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A powerful managerial challenge awaits a highly motivated IMS Professional. This person must be capable of managing a Data Base function that has pioneered IMS and is now launching a large new Development Project. It is going to take real know-how to design it's Data Bases in a 370/168, 158 VS Telecommunications environment.

This position requires more than average ability to manage. It requires exceptional knowledge of IMS Data Base Design, a proven track record of experience in a large scale systems environment with Data Base Development Control, and the ability to work with various levels of management in a dynamic environment.

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## Systems Analyst

Criminal Justice related agency, located in New York City, seeks manager for on-line minicomputer system. Experience in Criminal Justice or social service sectors preferred. Programming knowledge essential.

Salary range $14,000 to $17,000 per annum depending upon experience. Send resume to:

CW Box 5043
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Computer Services: Assistant Director/Assistant Professor or Instructor of Mathematics and Computer Science. Permanent position on twelve month contractual basis. Beginning 1 July-1 September 1977. One-half time directing academic computing services and one-half time undergraduate teaching. Ph.D. preferred; background in statistics, numerical analysis, and academic computer applications and programs required. Sympathy with the aims of a church-related liberal arts college required. Resume, credentials and three letters of recommendation directed specifically to this position should be sent to O.M. Gring, Assistant Academic Dean, Concordia College, Moorhead, MN 56560. Application deadline 1 June 1977.

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# DATA PROCESSING PROFESSIONALS

Progressive University Computer Center now engaged in major information system development and migration to MVS in 370/158 environment seeking qualified data processing professionals for IMS/DC and MVS support.

IMS/DC technical support candidates should have experience in IMS system generation, performance tuning, IMS dump analysis in OS/VS or MVS. VSAM experience desirable.

Systems Programmer candidates should have knowledge of SVS/MVS, HASP/JESS2, TSO, TCAM generation and maintenance. Will consider MVT, HASP, TSO/TCAM background. Opportunity for hardware/software monitor experience.

Fringe benefits include University paid educational assistance - Masters program in Information Sciences.

Submit resumes to:

**Ben Sheets, Emp Section**
**900 South 19th St.**
**Bishop Building, RM 217**
**Birmingham, Alabama 35294**
*Affirmative Action/Equal Opportunity Employer*

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# Programmer/ Analyst

Puget Power has immediate openings in its Business Computer Applications Group. These positions require a Bachelor's Degree or the equivalent with three to four years' experience as a Data Processing Systems Analyst, including a minimum of two years' COBOL programming experience. Knowledge of BAL and Data Base Design desirable.

Liberal fringe benefits. Qualified applicants forward complete resume in confidence indicating experience and salary requirements to **Industrial Relations Department, Puget Sound Power & Light Company, Puget Power Building, Bellevue, WA 98009, (206) 454-6363.**

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# IBM

Openings on a national & international basis for qualified EDP personnel. Partial list of current vacancies:

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| Sys Progs CICS . . . | to $25K |
| Sr Prog Anal CICS . . | $18-24K |
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## OVERSEAS

Sr analyst in Europe. 370/DOS/VS COBOL/RPG II, ISAM, VSAM, $17-21K plus 56 per cent in overseas bonus. IMMEDIATE NEED!

Contact Bill Denny, V.P. Call TOLL FREE 1 (800) 821-2270 X605 (MO. 1-(800) 892-7655).

Bill Denny
EDP Division
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438 Gulf Life Tower
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# SOUTHWEST

## PROGRAMMER/ ANALYST

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**EXPERIENCE A PLUS**
Send resume to: CW Box 5042
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Newton, Mass. 02160

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# PROGRAMMER ANALYST

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Heavy in Assembler and/or Fortran. Real time experience a plus. Excellent opportunity to grow, salary open. Reply promptly in detail to Bob Douglass, The Ledger, Box 408, Lakeland, Fl. 33802.

**Equal Opportunity Employer**
**We answer all replies**

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# OVERSEAS

## IMS, MVS TO $30K

Sysgen and Maintain IMS VS 1.1.3, MVS 3.7B. PL1 & COBOL IMS Programmer Analysts needed also. To $30K plus overseas benefits.

Call Collect: Sylvie B. Long
(213) 378-1831 or (213) 990-1875
LONG MANAGEMENT CONSULTANTS
15910 Venture Blvd. Suite 800
Encino, CA 81438

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JOHN CUMMINGS
FRANK LEONARD PERSONNEL
1211 No Westshore Blvd. Suite 100
Tampa, Fl 33607
(813) 872-1853

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**PROGRAMMER**

# MINI-COMPUTER

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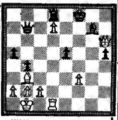

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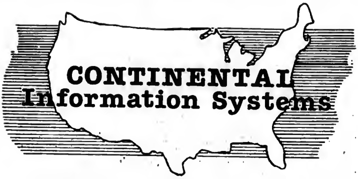

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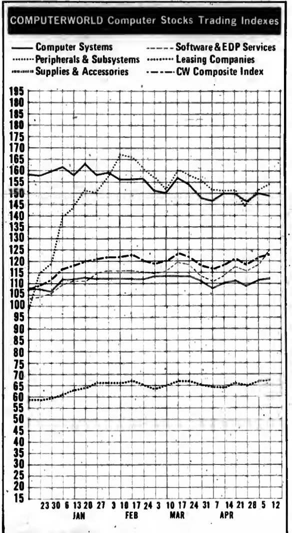

**COMPUTERWORLD Computer Stocks Trading Indexes**

# Earnings Reports

**DATA GENERAL**
Three Months Ended March 12

| | 1977 | s1976 |
|---|---|---|
| Shr Ernd | $.64 | $.43 |
| Revenue | 56,026,000 | 37,828,000 |
| Earnings | 6,321,000 | 4,257,000 |
| 6 Mo Shr | 1.24 | .81 |
| Revenue | 108,007,000 | 68,657,000 |
| Earnings | 12,263,000 | 7,933,000 |

s-Restated to reflect Digital Computer Controls, Inc. results.

**DATA RESOURCES**
Three Months Ended March 31

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.37 | s$.22 |
| Revenue | 5,504,400 | 3,771,000 |
| Earnings | 602,400 | 262,000 |

s-Adjusted to reflect 2.5-for-1 stock split in August 1976.

**DECISION DATA COMPUTER**
Three Months Ended Feb. 26

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.06 | .... |
| Revenue | 7,601,000 | $7,728,000 |
| Tax Cred | 156,000 | ..... |
| Earnings | 235,000 | (621,000) |

**IBM**
Three Months Ended March 31

| | 1977 (000) | 1976 (000) |
|---|---|---|
| Shr Ernd | $3.62 | $3.63 |
| Revenue | 4,090,205 | 3,814,617 |
| Earnings | 573,343 | 544,385 |

**INTEL**
Three Months Ended March 31

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.68 | s$.47 |
| sRevenue | 65,726,000 | 45,464,000 |
| Earnings | 7,323,000 | 5,003,000 |

s-Adjusted to reflect 50% stock dividend paid May 1976

**ITEL**
Three Months Ended March 31

| | 1977 | 1976 |
|---|---|---|
| Shr Ernd | $.61 | $.40 |
| Revenue | 78,600,000 | 57,200,000 |
| Spec Cred | s1,000,000 | ..... |
| Earnings | 6,500,000 | 2,800,000 |

s-$1,900,000 gain from accounting change less $900,000 loss from debenture redemption

# Computerworld Sales Offices

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# Computerworld Stock Trading Summary

CLOSING PRICES WEDNESDAY, MAY 11, 1977

All statistics compiled, computed and formatted by
TRADE★QUOTES, INC.
Cambridge, Mass. 02139

### COMPUTER SYSTEMS

| EXCH | | PRICE 1977 RANGE (1) | CLOSE MAY 11 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | AMDAHL CORP | 0- 39 | 25 1/4 | - 3/4 | -2.8 |
| N | BURROUGHS CORP | 55- 91 | 57 3/8 | -1 1/8 | -1.9 |
| O | COMPUTER AUTOMATION | 18- 25 | 22 3/4 | - 3/8 | -1.6 |
| N | CONTROL DATA CORP | 20- 26 | 21 3/8 | 0 | 0.0 |
| N | DATA GENERAL CORP | 35- 46 | 36 3/8 | -1 | -2.6 |
| O | DATAPOINT CORP | 18- 30 | 22 | +1 | +4.7 |
| N | DIGITAL EQUIPMENT | 37- 53 | 40 | + 3/4 | +1.9 |
| N | ELECTRONIC ASSOC. | 2- 3 | 1 7/8 | - 1/8 | -6.2 |
| A | ELECTRONIC ENGINEER. | 8- 10 | 6 1/4 | + 1/8 | +1.5 |
| O | FOUR-PHASE SYSTEMS | 14- 17 | 15 1/8 | + 1/4 | +1.6 |
| N | FOXBORO | 42- 54 | 53 1/2 | + 3/8 | +0.7 |
| O | GENERAL AUTOMATION | 6- 9 | 6 1/8 | - 1/2 | -7.5 |
| O | GRI COMPUTER CORP | 1- 1 | 5/8 | 0 | 0.0 |
| N | HEWLETT-PACKARD CO | 69- 87 | 72 5/8 | 0 | 0.0 |
| N | HONEYWELL INC | 44- 52 | 50 3/4 | - 1/2 | -0.9 |
| N | IBM | 253-286 | 252 3/4 | -10 1/8 | -3.8 |
| O | MANAGEMENT ASSIST | 6- 9 | 5 3/4 | - 1/4 | -4.1 |
| O | MEMOREX | 23- 29 | 24 3/8 | -1 1/4 | -4.8 |
| O | MICRODATA CORP | 7- 18 | 7 3/4 | - 1/8 | -1.5 |
| O | MODULAR COMPUTER SYS | 5- 7 | 7 1/8 | 0 | 0.0 |
| N | NCR | 32- 38 | 34 1/4 | - 1/8 | -0.3 |
| O | PRIME COMPUTER INC | 12- 17 | 14 1/8 | + 5/8 | +4.6 |
| N | PERKIN-ELMER | 17- 21 | 16 3/4 | - 1/4 | -1.4 |
| N | RAYTHEON CO | 55- 64 | 63 | - 5/8 | -0.9 |
| N | SPERRY RAND | 34- 42 | 35 7/8 | -1 1/4 | -3.3 |
| O | SYCOR INC | 8- 15 | 9 1/4 | - 1/2 | -5.1 |
| A | SYSTEMS ENG. LABS | 5- 7 | 6 1/4 | - 1/8 | -1.9 |
| N | VARIAN ASSOCIATES | 15- 20 | 19 7/8 | + 7/8 | +4.8 |
| A | WANG LABS. | 14- 18 | 16 | + 1/2 | +3.2 |

### LEASING COMPANIES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE MAY 11 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BOOTHE COURIER CORP | 8- 10 | 8 5/8 | - 1/2 | -5.4 |
| O | COMDISCO INC | 10- 13 | 10 1/2 | - 1/4 | -2.3 |
| A | COMMERCE GROUP CORP | 2- 2 | 2 1/8 | + 1/4 | +13.3 |
| A | COMPUTER INVSTRS GRP | 1- 2 | 1 | - 1/4 | -20.0 |
| M | DATRONIC RENTAL | 1- 2 | 1 | 0 | 0.0 |
| A | DCL INC | 1- 2 | 1 1/2 | + 1/4 | +20.0 |
| N | DPF INC | 6- 8 | 6 3/8 | 0 | 0.0 |
| N | ITEL | 13- 16 | 14 1/2 | + 1/4 | +1.7 |
| N | LEASCO CORP | 19- 24 | 22 | -1 1/2 | -6.3 |
| O | LEASPAC CORP | 1- 1 | 3/4 | + 1/4 | +50.0 |
| O | NAC INC | 0- 0 | 1/8 | -1/16 | -24.8 |
| A | PIONEER TEX CORP | 8- 11 | 8 1/4 | + 1/4 | +3.1 |
| N | U.S. LEASING | 10- 12 | 11 1/8 | - 1/4 | -2.1 |

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
L=NATIONAL; M=MIDWEST; O=OVER-THE-COUNTER
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### SOFTWARE & EDP SERVICES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE MAY 11 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | ADVANCED COMP TECH | 1- 2 | 1 1/8 | 0 | 0.0 |
| O | ANACOMP INC | 7- 9 | 9 1/4 | + 1/4 | +2.7 |
| A | APPLIED DATA RES. | 5- 7 | 6 1/8 | - 1/8 | -2.0 |
| N | AUTOMATIC DATA PROC | 23- 30 | 25 3/4 | + 3/4 | +3.0 |
| O | COLEMAN AMERICAN COS | 2- 2 | 1 7/8 | 0 | 0.0 |
| O | COMPU-SERV NETWORK | 10- 15 | 13 | +1 1/2 | +13.0 |
| O | COMP ELECTION SYSTMS | 6- 9 | 8 1/4 | - 1/8 | -1.4 |
| O | COMPUTER HORIZONS | 1- 1 | 1 1/4 | 0 | 0.0 |
| O | COMPUTER NETWORK | 6- 7 | 6 5/8 | + 7/8 | +15.2 |
| N | COMPUTER SCIENCES | 7- 9 | 7 1/8 | - 1/8 | -1.7 |
| O | COMPUTER TASK GROUP | 1- 2 | 2 | + 3/4 | +60.0 |
| O | COMPUTER USAGE | 2- 3 | 2 1/8 | + 1/8 | +6.2 |
| O | COMSHARE | 5- 7 | 5 1/4 | - 1/4 | -4.5 |
| O | DATA DIMENSIONS INC | 4- 5 | 3 3/4 | - 1/4 | -6.2 |
| O | DATATAB | 1- 2 | 2 | - 1/8 | -5.8 |
| N | ELECTRONIC DATA SYS. | 16- 19 | 17 | + 1/4 | +1.4 |
| O | INSYTE CORP | 2- 3 | 1 7/8 | + 1/8 | +7.1 |
| O | IRS COMPUTER MARKET. | 1- 2 | 1 1/2 | + 3/4 | +100.0 |
| O | KEANE ASSOCIATES | 3- 4 | 3 1/4 | - 5/8 | -16.1 |
| O | KEYDATA CORP | 2- 3 | 2 1/4 | + 1/4 | +12.5 |
| A | LOGICON | 7- 16 | 14 | - 5/8 | -4.2 |
| A | MANAGEMENT DATA | 1- 2 | 1 1/4 | 0 | 0.0 |
| A | NATIONAL CSS INC | 19- 25 | 19 1/2 | + 1/8 | +0.6 |
| O | NATIONAL DATA CORP | 5- 7 | 4 7/8 | + 1/8 | +2.6 |
| A | ON LINE SYSTEMS INC | 18- 22 | 18 3/8 | + 5/8 | +3.5 |
| N | PLANNING RESEARCH | 4- 5 | 3 1/2 | - 1/8 | -3.4 |
| O | PROGRAMMING & SYS | 1- 1 | 3/4 | 0 | 0.0 |
| O | RAPIDATA INC | 2- 3 | 2 | - 1/8 | -5.8 |
| O | REYNOLDS & REYNOLDS | 17- 20 | 17 1/4 | + 3/4 | +4.5 |
| O | SCIENTIFIC COMPUTERS | 1- 3 | 2 3/4 | + 1/8 | +4.7 |
| O | TYMSHARE INC | 14- 20 | 17 1/4 | +1 | +6.1 |
| A | URS SYSTEMS | 4- 5 | 4 1/2 | - 1/4 | -5.2 |
| N | WYLY CORP | 1- 2 | 1 1/2 | 0 | 0.0 |

### PERIPHERALS & SUBSYSTEMS

| EXCH | | PRICE 1977 RANGE (1) | CLOSE MAY 11 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| N | ADDRESSOGRAPH-MULT | 10- 14 | 10 7/8 | - 1/4 | -2.2 |
| O | ADVANCED MEMORY SYS | 7- 9 | 8 | + 1/8 | +1.5 |
| N | AMPEX CORP | 8- 9 | 9 3/8 | + 5/8 | +8.0 |
| O | ANDERSON JACOBSON | 3- 4 | 3 1/2 | 0 | 0.0 |
| N | APPLIED DIG DATA SYS | 10- 16 | 11 | - 1/8 | -1.1 |
| O | BEEHIVE INT'L | 10- 12 | 9 7/8 | + 1/8 | +1.2 |
| A | BOLT,BERANEK & NEW | 7- 8 | 6 3/4 | - 1/8 | -1.8 |
| N | BUNKER-RAMO | 8- 12 | 9 5/8 | - 3/8 | -3.7 |
| A | CALCOMP | 3- 5 | 2 3/4 | - 1/8 | -4.3 |
| O | CAMBRIDGE MEMORIES | 1- 2 | 1 1/4 | + 1/4 | +31.2 |
| N | CENTRONICS DATA COMP | 22- 28 | 24 3/8 | +2 3/8 | +10.7 |
| O | CODEX CORP | 31- 47 | 46 1/2 | + 1/2 | +1.0 |
| O | COGNITRONICS | 1- 1 | 7/8 | 0 | 0.0 |
| O | COMPUTER COMMUN. | 5- 6 | 5 1/2 | + 3/8 | +7.3 |
| O | COMPUTER CONSOLES | 4- 6 | 5 1/2 | + 1/4 | +4.7 |
| A | COMPUTER EQUIPMENT | 2- 3 | 3 | - 1/8 | -4.0 |
| O | COMPUTER TRANSCEIVER | 1- 1 | 1 1/4 | + 1/8 | +11.1 |
| O | COMTEN | 10- 13 | 11 | - 5/8 | -5.3 |
| N | CONRAC CORP | 24- 27 | 25 3/4 | -1 | -3.7 |
| O | DATA ACCESS SYSTEMS | 4- 5 | 4 3/4 | 0 | 0.0 |
| O | DATA 100 | 7- 8 | 7 | - 1/8 | -1.7 |
| A | DATA PRODUCTS CORP | 9- 13 | 10 3/8 | + 1/8 | +1.2 |
| O | DATA TECHNOLOGY | 3- 4 | 3 3/4 | + 1/8 | +3.4 |
| O | DATUM INC | 1- 2 | 1 1/2 | 0 | 0.0 |
| O | DECISION DATA COMPUT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | DELTA DATA SYSTEMS | 1- 1 | 3/8 | 0 | 0.0 |
| N | ELECTRONIC M & M | 4- 5 | 4 1/8 | - 1/8 | -2.9 |
| O | FABRI-TEK | 1- 2 | 7/8 | - | -6.2 |
| O | GENERAL COMPUTER SYS | 0- 2 | 1 1/2 | + 1/2 | +50.0 |
| N | HAZELTINE CORP | 9- 12 | 10 1/8 | +1 1/8 | +12.5 |
| N | HARRIS CORP | 28- 39 | 37 3/4 | -1 | -2.5 |
| A | INCOTERM CORP | 12- 15 | 12 | 0 | 0.0 |
| O | INFOREX INC | 4- 7 | 4 1/4 | - 5/8 | -12.8 |
| O | INFORMATION INTL INC | 11- 14 | 10 3/4 | - 5/8 | -5.4 |
| O | INTEL CORP | 38- 57 | 45 | +1 1/2 | +3.4 |
| A | LUNDY ELECTRONICS | 3- 6 | 4 1/8 | 0 | 0.0 |
| O | MSI DATA CORP | 6- 8 | 7 3/4 | 0 | 0.0 |
| N | MOHAWK DATA SCI | 5- 8 | 4 1/2 | - 5/8 | -12.1 |
| O | PENRIL CORP | 2- 5 | 4 1/2 | 0 | 0.0 |
| A | PERTEC CORP | 7- 9 | 6 1/2 | - 3/8 | -5.4 |
| A | POTTER INSTRUMENT | 2- 2 | 1 3/4 | 0 | 0.0 |
| O | PRECISION INST. | 2- 2 | 1 1/2 | 0 | 0.0 |
| O | QUANTOR CORP | 4- 5 | 4 3/8 | 0 | 0.0 |
| O | RECOGNITION EQUIP | 7- 10 | 7 1/4 | 0 | 0.0 |
| O | SCAN DATA | 1- 2 | 1 1/2 | - 1/8 | -7.6 |
| O | STORAGE TECHNOLOGY | 10- 12 | 10 1/4 | + 1/4 | +2.5 |
| O | T BAR INC | 7- 10 | 9 3/8 | + 1/8 | +1.3 |
| O | TALLY CORP. | 4- 6 | 4 5/8 | - 1/8 | -2.6 |
| O | TEC INC | 7- 9 | 8 3/4 | + 3/4 | +9.3 |
| N | TEKTRONIX INC | 29- 68 | 29 | -30 1/4 | -51.0 |
| N | TELEX | 2- 3 | 2 3/8 | - 1/4 | -9.5 |
| O | WILTEK INC | 1- 1 | 1/4 | 0 | 0.0 |

### SUPPLIES & ACCESSORIES

| EXCH | | PRICE 1977 RANGE (1) | CLOSE MAY 11 1977 | WEEK NET CHNGE | WEEK PCT CHNGE |
|---|---|---|---|---|---|
| O | BALTIMORE BUS FORMS | 2- 4 | 2 1/4 | 0 | 0.0 |
| A | BARRY WRIGHT | 10- 14 | 13 1/4 | + 1/4 | +1.9 |
| O | CYBERMATICS INC | 1- 1 | 1/2 | 0 | 0.0 |
| O | DUPLEX PRODUCTS INC | 14- 18 | 15 7/8 | - 3/8 | -2.3 |
| N | ENNIS BUS. FORMS | 6- 7 | 5 3/4 | - 1/8 | -2.1 |
| O | GRAHAM MAGNETICS | 11- 14 | 12 | + 3/4 | +6.6 |
| O | GRAPHIC CONTROLS | 15- 17 | 16 | - 1/2 | -3.0 |
| N | 3M COMPANY | 48- 56 | 50 1/4 | + 1/8 | +0.2 |
| O | MOORE CORP LTD | 30- 37 | 30 3/4 | 0 | 0.0 |
| A | NASHUA CORP | 16- 19 | 18 1/4 | + 1/4 | +1.3 |
| O | STANDARD REGISTER | 18- 22 | 21 1/2 | + 1/4 | +1.1 |
| O | TAB PRODUCTS CO | 13- 17 | 15 7/8 | - 1/8 | -0.7 |
| N | UARCO | 19- 22 | 20 3/8 | + 1/8 | +0.6 |
| A | WABASH MAGNETICS | 10- 14 | 14 3/8 | +1 3/4 | +13.8 |
| N | WALLACE BUS FORMS | 17- 21 | 17 3/4 | 0 | 0.0 |

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